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ABSTRACT

This guide provides activities based on 13 Mathnet cases that are part of the television program Square One TV. Mathnet is a detective serial which ends each program. Each Mathnet activity consists of a case summary, two short activities, and one longer step-by-step activity, with a reproducible student activity page. Topics include geometry, statistics, graphing, finance, percentages, dimensions and scale models, estimation, averaging, volume, and area. The curriculum goals of Square One TV are also included. (KR)

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Television MATHEMATICS

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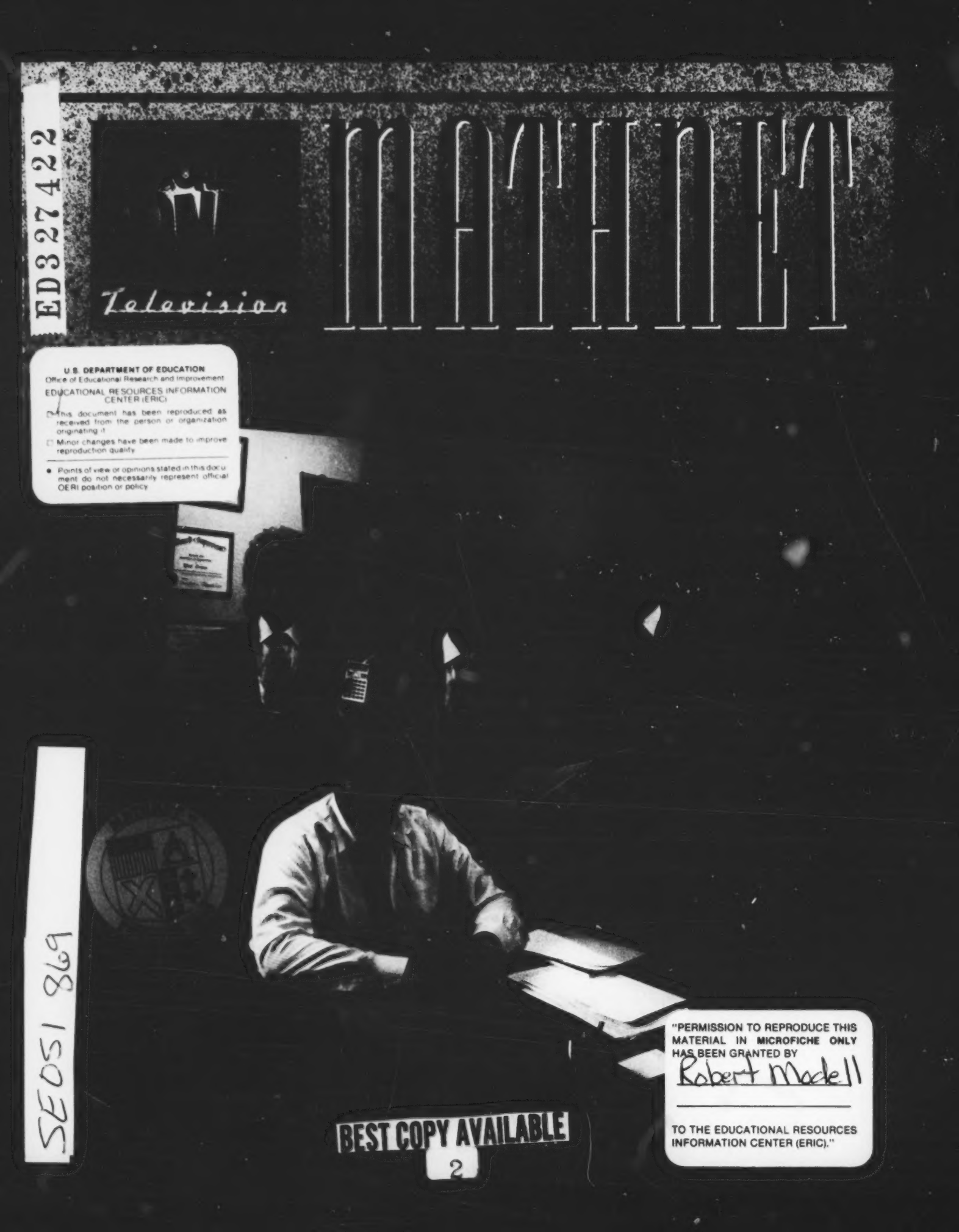

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MATHNET

SQUARE ONE TV

PRODUCTION

Executive Producer	*David D. Connell*
Senior Producer/Head Writer	*Jim Thurman*
Producers	*Jeanne Shanahan, Stephanie Hochman*
Directors	*Mike Gargiulo, Ted May, Dan Smith*
Mathnet Producer	*Janette M. Webb*
Mathnet Writers	*David D. Connell, Jim Thurman*
Mathnet Directors	*Charles S. Dubin, James Golway, Karl Epstein*
Director of Content	*Joel Schneider, Ph.D.*
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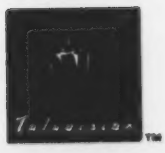
MATHNET

TEACHER'S GUIDE



INTRODUCTION

ABOUT SQUARE ONE TV

SQUARE ONE TV is a unique television series about mathematics, produced by the Children's Television Workshop (CTW), creators of SESAME STREET, THE ELECTRIC COMPANY, and 3-2-1 CONTACT. The first thing you should know about SQUARE ONE TV is that WE WANT YOU TO COPY OR VIDEOTAPE IT OFF THE AIR, AND USE IT IN THE CLASSROOM. It's perfectly legal as long as you erase the tapes within three years.

SQUARE ONE TV airs Monday through Friday on most member stations of the Public Broadcasting Service (PBS). It's aimed at the nation's 14 million 8 to 12 year olds. Each half-hour show includes several segments, many of which parody familiar television formats, such as: game shows, sit-coms, commercials, music videos, and so on.

ABOUT MATHNET

SQUARE ONE TV concludes each show with MATHNET. Kate Monday, George Frankly, and Debbie Williams are a team of ace mathematicians working with the L.A. Police Department. They use their mathematical skills to solve all sorts of cases, from finding a buried treasure to apprehending a chain-store bandit.

The mission of Mathnet is problem solving. The Mathnetters use a variety of strategies and skills as they investigate crimes. As in real life, they must discard extraneous clues, follow up on the promising ones, estimate, look for patterns, and use a wide variety of resources such as maps, compasses, rulers, computers, and data bases.

The Mathnetters' motto is, *"to cogitate and to solve."* Together they review the facts, try not to overlook the obvious, and if they're stumped, look at the problem from another angle. Sometimes they use mental arithmetic. Frequently they approximate. And occasionally, the Mathnetters will even use the calculators they carry in their holsters.

ABOUT THE TEACHER'S GUIDE

The mission of the Teacher's Guide is to acquaint you with the possibilities for using MATHNET in your classroom. The adventures of Kate and George are a unique and popular part of SQUARE ONE TV, and the guide provides some useful activities based on the programs. These activities have been carefully designed to invite student interest, and to treat specific mathematical ideas in ways that will be fun and memorable. The goal is to use the show to get your kids thinking.

The Teacher's Guide features all thirteen MATHNET cases. Each one is summarized in the JUST THE FACTS section, and there's a MATHNET CASEBOOK activity which provides one page to be reproduced and distributed to your class. These pages are accompanied by step-by-step instructions, and can be the focus of a complete lesson. If you use MATHNET as a regular part of your mathematics program, kids can collect these pages and compile their own MATHNET CASEBOOKS. We've even provided a Casebook Cover at the end of the guide. The DATA FILE portions tend to be shorter and make use of a specific aspect of the day's episode to spark discussions with your class.

This guide also features a "pull-out" SQUARE ONE TV Program Guide. This insert contains detailed run-downs of each half-hour show for seasons one and two, along with content goals for each segment. (See SQUARE ONE TV Curriculum Goals on pages 30-31.)

The original SQUARE ONE TV Teacher's Guide (published as a separate edition) builds activities around other repeating SQUARE ONE TV formats: Mathman, Backstage With Blackstone, and the Game Shows. It can be ordered by sending a check for $2.00 to:

SQUARE ONE TV TEACHER'S GUIDE
Children's Television Workshop
One Lincoln Plaza
New York, NY 10023

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SQUARE ONE TV is funded by the National Science Foundation, Corporation for Public Broadcasting, the Andrew W. Mellon Foundation, the U.S. Department of Education, and the Carnegie Corporation of New York. Funds for the production of season one were also provided by IBM.

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THE CASE OF THE

MAP WITH A GAP

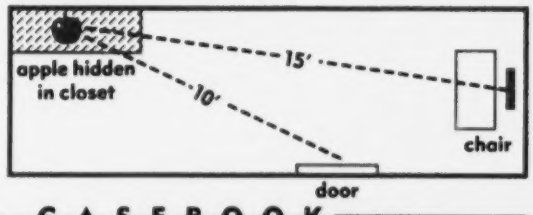
Mathnet faces a wild and woolly mystery, as Kate and George help young Bronco Guillermo Gomez search for gold stolen by Saddlesore Capone back in 1853. With half a treasure map and some information from librarian D. John Mutard, they head for Mulch Gulch, a ghost town. Scruffy Rommel, a foxy desert rat, tries to scare them off, but gets interested in Kate and George's mathematical approach to gold-digging. They read the map in a cylindrical mirror and use triangulation—but instead of treasure, they find another cryptic message from Saddlesore Capone. Understanding this message finally leads them to Saddlesore's hidden hoard. But they still have to outwit ornery D. John Mutard, who tries to steal their gold.

Book 'Em!

Walter, Marion. *The Mirror Puzzle Book*. New York: Parkwest Publications, 1985.

DATA FILE Monday: Saddlesore Capone stole 15 pounds of gold back in 1853. When George tries to figure out the haul at today's values, Bronco reminds him that there's a special measurement system for gold. In the troy system, there are 12 troy ounces to the troy pound. Many businesses—and cultures—have their own systems of weights and measures. Why not let the class create its own? Units of length are probably the easiest measurement to start with. Declare the stapler to be one "floot" long. Mark off "fleet" on a ribbon to make a tape measure. How many "fleet" wide is the classroom?

DATA FILE Wednesday: Scruffy Rommel, the foxy old desert person, doesn't think much of mathematics. He claims it's only about numbers. But Kate and George teach him that mathematics is a great deal more than that. To find the location of the buried treasure, they use triangulation. Why don't you hide something in the classroom and give as clues the distance from two landmarks? Add a little string and you, too, are in the geometry business.



MATHNET CASEBOOK

MORE THAN MEETS THE EYE

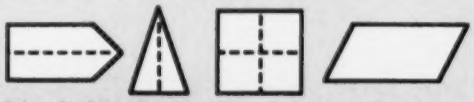
As Kate, George, and Bronco Guillermo search for the hidden gold, they encounter clues with a lot more than meets the eye. These clues make sense only when seen in a mirror. The concept of symmetry plays a big part in Saddlesore Capone's secret messages. Can you find letters and words which have mirror symmetry?

DOING THE ACTIVITY

What You Need: Copies of the activity page, rulers, pencils, a few small mirrors.

What To Do:

Step 1: Cut out some large geometrical figures and fold them to illustrate horizontal lines of symmetry and vertical lines of symmetry. Be sure to include some figures which have both and others which have none. Following are some suggestions.

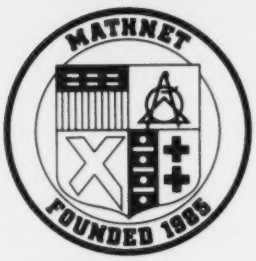


Step 2: Distribute copies of the activity page, MORE THAN MEETS THE EYE. Have your students identify letters and words which are symmetrical. They should use a ruler to draw the line of symmetry. (You can use a small mirror to confirm their work and/or to help students who are having difficulty with the concept.)

Step 3: Have students try to think of other words which have a line of symmetry. They can write these words in the spaces provided.

FOLLOW UP

Using the individual lists developed in Step 3 as a starting point, create a class list of symmetrical words. You may want to allow students to "cheat" a little by writing the word "BAD" as "B ≪ D".

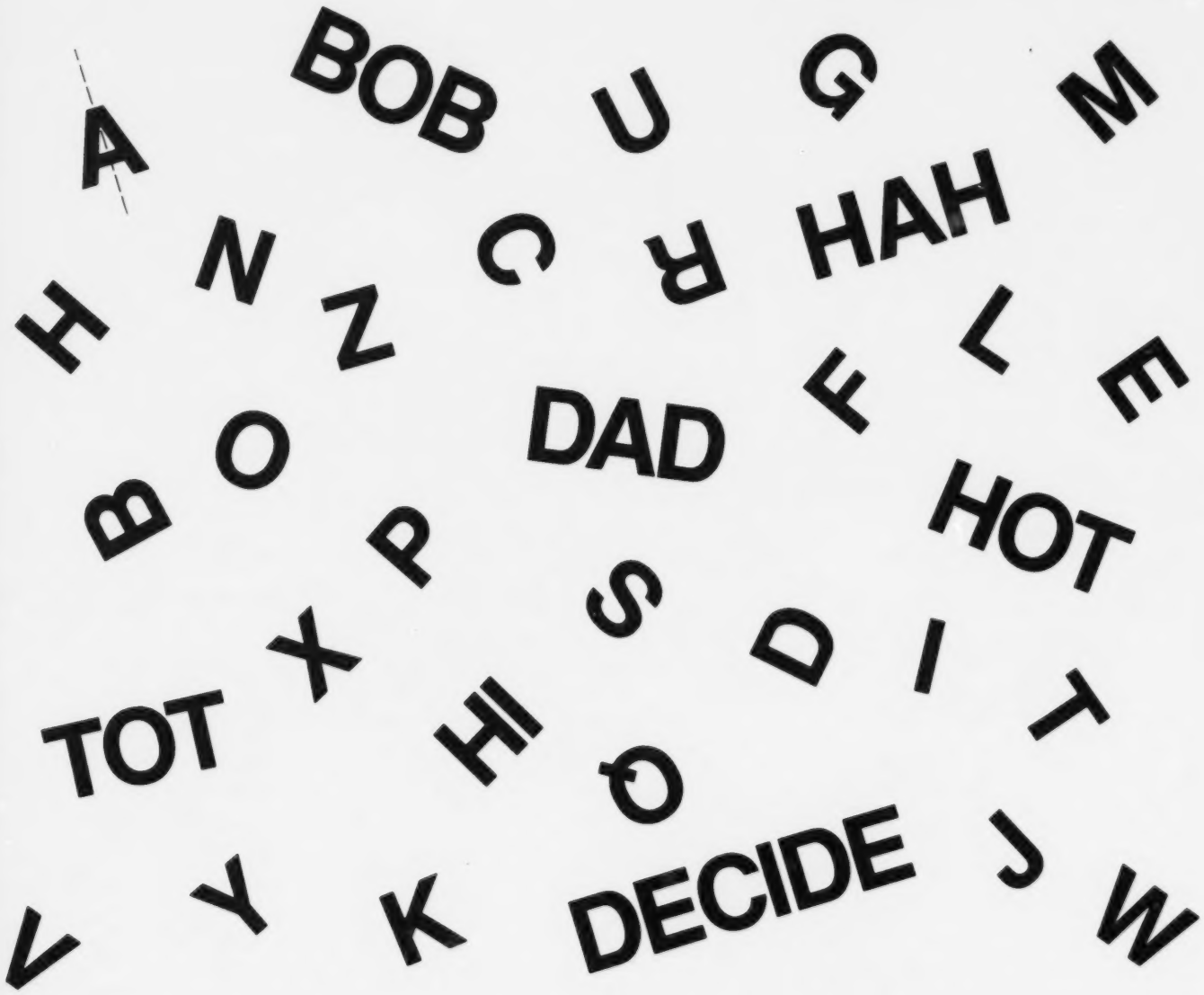


"to cogitate and to solve"

Mathematician _____

Date _____

More than meets the EYE



_____ _____

_____ _____

_____ _____

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THE CASE OF THE

GREAT CAR ROBBERY

Mathnet goes into high gear to solve a mystery—nearly 20,000 automobiles recently disappeared in the greater Los Angeles area. One theft victim is Li So, whose mom's car was taken off the street by police tow truck 317—but there is no police tow truck 317. Where do the missing cars go? They don't seem to leave town by land, sea, or air. To track down the car thieves, Kate and George set a trap. They take the police tow trucks off the street, and leave out some tempting bait: a big, unattended limousine, with George and a homing device hidden inside. The rogue tow truck soon shows up. But before the good guys can close in, the limo ends up in a junk yard hydraulic press—and George faces a tight escape.

DATA FILE

Tuesday: The Mathnet team learns that last year 56,000 cars were stolen in L.A. Hoping to make that statistic more meaningful, Kate, George, and Debbie calculate both the monthly average and the weekly average. While the 56,000 figure quoted in the show may be fictitious, here are some real figures gathered in recent years: Each day, the United States junks 90 million bottles and jars, 46 million cans, 30,000 cars, and 25,000 television sets. Can you and your class give more meaning to these numbers? You may want to consider that the United States has about 90 million households and a population of about 250 million people.

MATHNET CASEBOOK

CRUNCHY DATA

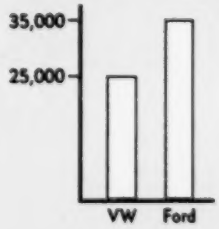
With 56,000 cars stolen in the last year, the Mathnetters have lots of raw data to work on. They divide it up in all sorts of ways: When were the cars stolen? Was car color a factor? What models were stolen? By analyzing these and other factors, the Mathnetters are led to the conclusion that the important variable is simply the car's weight. Bar graphs help them to see the light. Can your Mathnet graph squads do a similar analysis on the fresh data below?

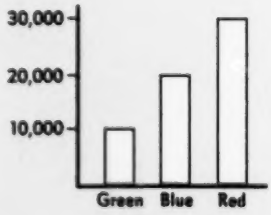
DOING THE ACTIVITY

What You Need: Copies of the activity page, rulers, pencils, graph paper.

What To Do:

Step 1: Look over the charts below. They summarize some fictitious data we made up about cars stolen in the United States in 1987.



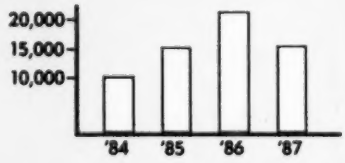


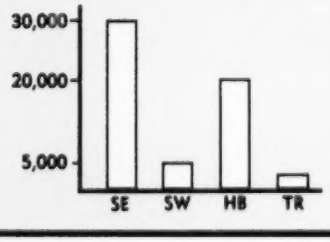
Step 2: Reproduce the charts on the board and help the class to understand what is represented. You might ask if the thieves have a favorite color? Can you be sure? Why do you think that more sedans are stolen than trucks?

Step 3: Distribute copies of the activity page, CRUNCHY DATA, as well as graph paper, pencils, and rulers as necessary. Explain that this is "raw data" for the first two months of 1988.

Step 4: Have the class analyze the data and make bar graphs similar to those on the board.

Step 5: Discuss the analysis as a group. Does the color of the vehicle seem important? What about the year? Do January and February show different results?





Book 'Em!

Parker, Tom. *In One Day*. Boston, Massachusetts: Houghton Mifflin, 1984.

"to cogitate and to solve"

Mathematician _____

Date _____

Crunchy Data

Model	Color	Body Type	Year
VW	R	TR	85
VW	G	HB	87
F	B	HB	88
VW	B	TR	86
F	B	HB	85
VW	G	SE	87
VW	G	SW	87
VW	B	TR	86
F	R	TR	86
F	R	SW	85
VW	G	TR	88
F	B	SW	88
VW	R	SE	86
VW	G	TR	86
F	B	SW	85
VW	R	TR	86
F	B	SW	88
F	G	TR	87

Model	Color	Body Type	Year
F	B	SE	88
VW	R	TR	86
F	R	HB	85
VW	G	TR	86
VW	B	SE	87
F	R	TR	86
F	G	HB	88
F	R	HB	87
VW	G	SE	86
VW	G	TR	86
F	B	TR	86
F	B	SW	85
F	G	TR	86
VW	R	SW	88
F	R	TR	86
F	R	HB	87
F	G	TR	86
VW	B	SE	88

January, 1988

Model	Color	Body Type	Year
F	B	SW	86
F	R	TR	88
F	R	SW	86
VW	G	SE	87
F	B	SE	88
VW	B	SW	85
VW	R	SW	86
F	G	HB	85
F	R	HB	87
VW	B	SW	86
F	G	SE	86
VW	G	TR	85
VW	R	SW	85
F	G	HB	88
VW	B	SW	86
VW	G	HB	85
F	G	SW	87
VW	R	SE	87

Model	Color	Body Type	Year
F	R	SE	87
F	B	SW	86
F	B	SW	88
VW	R	SW	86
VW	G	TR	86
F	B	HB	85
F	G	SW	86
VW	R	SE	85
VW	R	TR	87
F	R	SW	86
VW	G	HB	85
F	B	TR	88
VW	B	SW	86
VW	B	SW	87
F	G	SE	88
F	G	SW	86
VW	B	HB	86
F	R	SW	86

February, 1988

VW–Volkswagen
F–Ford

R–Red
G–Green
B–Blue

TR–Truck
HB–Hatchback
SE–Sedan
SW–Station Wagon

Note: This is not the same data as used in the show.

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THE VIEW FROM THE

REAR TERRACE

A sprained knee has broken up the Mathnet team—Kate's home in a wheelchair, as George works solo on a case of "bank pranks"—tricks which drive away bank customers. Each prank is accompanied by a poem—written, George discovers, on a deposit slip from the next bank to be pranked. But the prankster turns nasty, sending out a bomb threat. Meanwhile, as Kate looks out her back terrace, she sees her neighbor Raymond Sticker building a bomb in a clock. George doesn't believe her story—until he discovers Raymond Sticker has a grudge against A. Holding Coe, who owns all the banks being pranked. George must disarm a bomb meant to blow up Coe, then race to defuse a second bomb left to eliminate the only witness—Kate!

Book 'Em!

Logothetti, Dave, and Logothetti, Teddy. *What's My Rule?* Palo Alto, CA Dale Seymour Publications, 1983.

DATA FILE Wednesday: A string of 6 "bank pranks" has caused each of the 6 banks to suffer a decrease in deposits. The average percentage loss so far is 22.5%.

	% Lost	
Last National Bank	18%	Average = 22.5%
Average National Bank	31%	
Calendar National Bank	%	
Plumber's Savings and Loan	%	
Next to Last National Bank	%	
Farmer's Trusty Bank	%	

Now Alien Savings has been pranked and its deposits go down by 8%. What is the average percentage loss for all 7 banks taken together? Why can't you just add 8% to 22.5% and divide by 2? You could go back to previous shows to see what percentage each bank lost. But that isn't necessary. What would Kate and George do?

DATA FILE Thursday: George, disguised as Assistant Manager for Very Small Loans at Safe Enough Savings, patiently explains to a crabby customer that his bank pays 6 percent simple interest, compounded annually. (One hundred dollars left on deposit for one year will earn $6.00.) To compare Safe Enough with other local banks, George created the chart below. Look for patterns as you help George finish the job.

RATE	BANK	AMOUNT DEPOSITED					
		$100	$50	$75	$1000	$2000	$2500
6%	Safe Enough	$6	$3	$4.50			
	Cheapo National	$3					
12%	Bankrupt Savings						
	Bucks County Bank		$4.50				

MATHNET CASEBOOK

PATTERN PATROL

Kate thinks she's found a pattern in the bank pranks. Even though it turns out she's wrong in this case (her pattern is mere coincidence), she's got the right idea. As George puts it, "We always look for patterns when we're trying to solve certain kinds of problems." Here are some number sequence patterns straight from Mathnet Training School:

DOING THE ACTIVITY

What You Need: Copies of the activity page, pencils.

What To Do:

Step 1: Distribute the activity page, PATTERN PATROL. Encourage students to work on their own to discover the pattern and write the next terms of the series. (If your students have never worked on this kind of problem before, you should introduce the activity by doing a few of the problems at the board.)

Step 2: Circulate around the room giving clues (not solutions) as necessary.

FOLLOW UP

This search for patterns can also be a teacher-led group activity.

Step 1: Think of a number sequence and write the first few terms on the board.

Step 2: One by one, students who think they know what comes next silently come to the board and fill in the next term.

Step 3: If the answer fits the sequence, and your board did not announce what comes next, the answer does not fit, erase it and leave another student try.

Step 4: Continue until the entire class sees the pattern. Once the pattern is revealed, discuss any alternative solutions. Students may have thought of different, yet equally valid, patterns.

MATHNET
FOUNDED 1985

"to cogitate and to solve"

Mathematician _____

Date _____

PATTERN PATROL

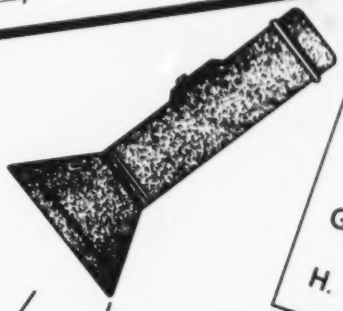
MATHNET TRAINING SCHOOL

A. 2, 4, 6, 8, ____, ____, ____, ____, ____,

B. 3, 7, 11, 15, ____, ____, ____, ____, ____,

C. 1, 3, 9, 27, ____, ____, ____, ____, ____,

D. 2, 5, 11, 23, ____, ____, ____, ____, ____,



MATHNET TRAINING SCHOOL

E. 1, 4, 9, 16, ____, ____, ____, ____,

F. 1, 3, 6, 18, 36, ____, ____, ____, ____,

G. 1, 3, 6, 10, 15, ____, ____, ____, ____,

H. 2, 3, 5, 6, 8, 9, 11, ____, ____, ____, ____,

MATHNET TRAINING SCHOOL

I. 1, 5, 17, 53, ____, ____, ____, ____,

J. 4, 5, 9, 14, 23, ____, ____, ____, ____,

K. 5, 4, 7, 6, 9, 8, 11, ____, ____, ____, ____,

MATHNET TRAINING SCHOOL

L. 3, 5, 9, 17, 33, ____, ____, ____, ____,

M. 2, 4, 3, 6, 5, 10, 9, ____, ____, ____, ____,

N. 1, 2, 1, 4, 7, 12, 23, ____, ____, ____, ____,

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THE CASE OF THE

DECEPTIVE DATA

George is upset by the cancellation of his favorite show, "Mike Pliers." Mike, who solves crimes with brains, not fists, lost in the ratings to brainless competition, "The Vicious Vinnie Vermin Show." At the Hoover TV Rating Service, executive Wellworth Watching shows how the ratings work. But the company's president passes on hotter information —a computer breakin has made all the ratings data suspect. The Mathnetters find critical data changes: Mike Pliers' ratings slipped, while Vicious Vinnie's shot up. More investigating reveals that somebody tampered with the ratings boxes. But who? Wellworth Watching, a soured TV personality who vowed revenge—and, while posing as Vicious Vinnie, nearly got it.

Book 'Em!

Shulte, Albert, and Choate, Stuart A. *What Are My Chances?* Sunnyvale, California: Creative Publications, 1977.

DATA FILE Wednesday: Organize your students into Mathnet Chart and Graph Teams. Have them collect as many charts and graphs as they can. Look in newspapers and magazines, and even at TV commercials. Examine items from the collection—what does the horizontal axis represent? How about the vertical? Is there anything misleading about the presentation? Have students present the data in a different way.

DATA FILE Friday: Kate and George don't need calculators to figure 10% of 180, or even 40% of 450. Help students learn how to do these kinds of computations in their heads. After all, 10% is just another way to say one-tenth, 25% is one-fourth, and 50% is one-half. Get started with problems like these: If 10% of 200 is 20, then 40% of 200 must be ??? If 10% of 40 is 4, then 5% of 40 is ??? That means 15% of 40 must be ??? Use these ideas to complete the following chart.

	5%	10%	15%	20%	25%	50%	75%
200		20					
300						150	
500							
40							
540							

MATHNET CASEBOOK

SIMPLE SAMPLING

The Hoover TV Rating Service makes conclusions about a very large population (millions of households with television sets) by getting information from only a small sample of them. Let's take some samples of our own.

DOING THE ACTIVITY

What You Need: A collection of 100 marbles (or chips or cubes), with 30 of one color (say, red), and 70 of another. Also, a wide-mouthed non-transparent container to hold the marbles.

What To Do:

Step 1: Place the collection of marbles at the front of the room and reproduce the activity page on the chalk board. Explain that the container has 100 marbles, 30 of which are red.

Step 2: Have a student randomly select 10 marbles without looking.

Step 3: On the board, record the number which are red in Table 1. Record the percentage which are red in Table 2.

Step 4: Replace the 10 marbles, mix the collection, and have another student pick 10 marbles. Record the number which are red in Table 1.

Step 5: Calculate the percentage of the total of the 20 pulled marbles which are red. (If 5 of the first sample were red and 3 of the second sample were red, then 8 of 20, or 40%, were red.) Record the result on the graph in Table 2.

Step 6: Repeat the procedure above at least 20 times. Be sure to keep track of the cumulative percent in Table 2. Discuss the results as they evolve. In reviewing Table 1, what numbers come up most? What numbers come up least? How do the results compare with what you might expect? How would you describe the shape of the graph in Table 2?

FOLLOW UP

1. Change the composition of the collection of marbles, but don't tell the class how. Distribute the activity page, SIMPLE SAMPLING. Have students conduct the sampling experiment on their own or in small groups, then guess at the composition.

2. Try sampling from an unknown universe. Can you identify the most popular candies in the school by asking only a small number of students?

MATHNET FOUNDED 1985

"to cogitate and to solve"

Mathematician _____

Date _____

SIMPLE SAMPLING

Trial Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Number of Red Marbles																				

Table 1

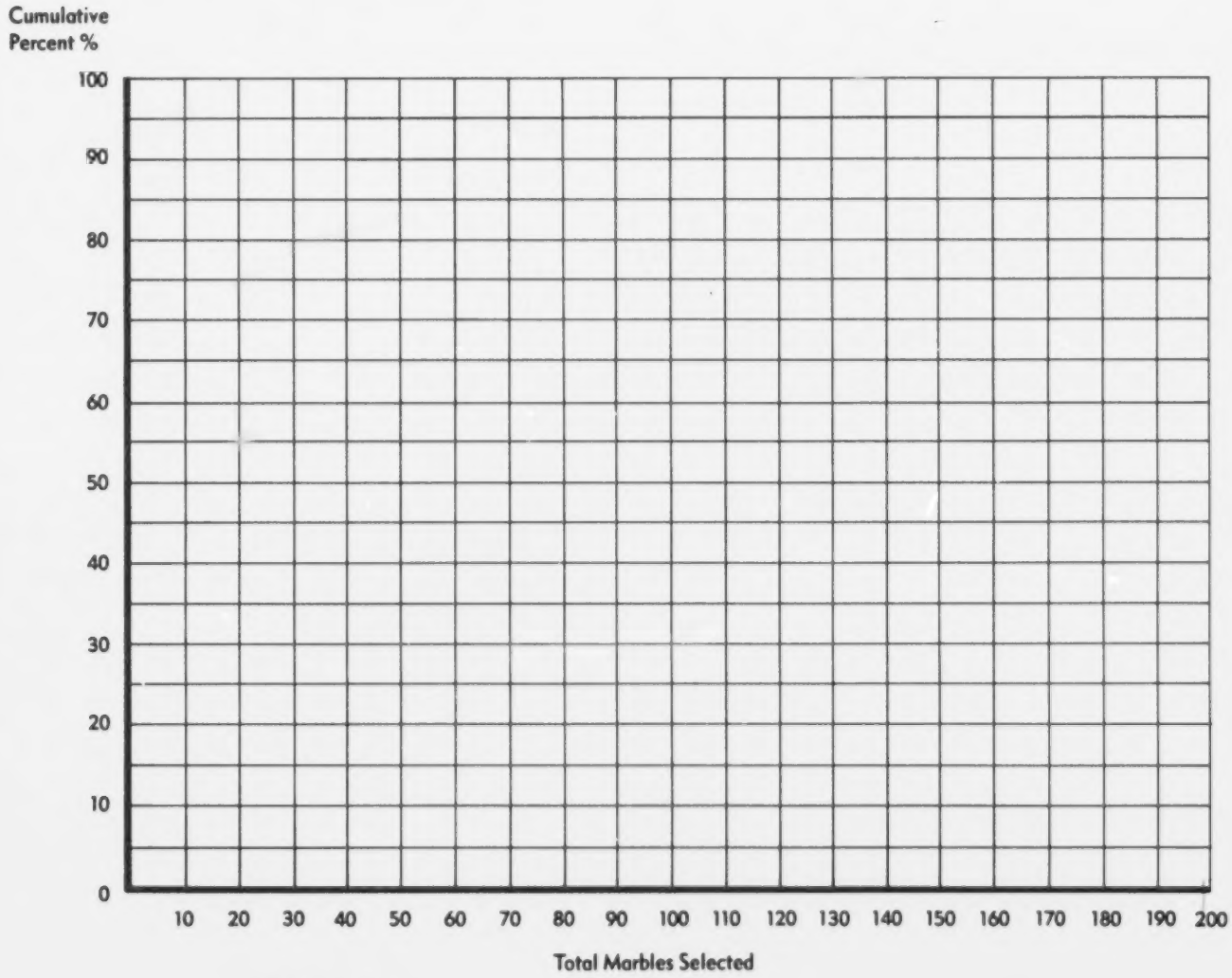

Table 2

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THE CASE OF THE

WILLING PARROT

Mathnet investigates a haunted house. Late movie great Fatty Tissue left his mansion to a pet parrot, Little Louie, with young Walter Treppling as guardian. Walter keeps hearing mysterious moans in the house. When Kate and George check them out, they find Norman Tedge, who is seeking Fatty's hidden fortune. Little Louie is the key to the treasure, leading our heroes to a hidden safe by repeating a Fibonacci number sequence. Inside is another mathematics puzzle, which sends them to a wall with a mysterious pattern of tiles. Before they decode this puzzle, Little Louie is birdnapped. They find the culprit—Norman Tedge—but there's still the secret of the tiles. Walter figures it out, and wins Fatty's entire fortune.

Book 'Em!

Garland, Trudi H. *Fascinating Fibonaccis.* Palo Alto, CA: Dale Seymour Publications, 1987.

DATA FILE Monday: Little Louie, the parrot, has it made! His cage is decorated like a drawing room. Everything in it, furniture, fireplace, even the magazines on the coffee table, is a model, one-twelfth the usual size. What needs to be done to construct a scale model of your classroom? What are its dimensions? How big are the things that are in it? How big should the models be? A lot of measuring and building needs to be done. This is a project for several Mathnet Scaling Teams.

DATA FILE Wednesday: It's a good thing that Kate and George know so much about Fibonacci and his sequences. But to them, this is just another ordinary crimestopping tool. They know that to begin a Fibonacci sequence you start with any two numbers—say 3 and 4. Add them to get the third term, 7. Now add 4 and 7 to get 11, and now add 7 and 11 to get 18. Keep on going—forever!

3, 4, 7, 11, 18, . . .

Can anyone find a Fibonacci sequence with consecutive terms of 13 and 20? What about 40, ?, 105? What about 10, ?, ?, 42?

MATHNET CASEBOOK

MOD MATH

The Fibonacci sequence of tiles in the wall of the estate is a vital clue to finding Fatty Tissue's fortune. But it's hard to figure out the pattern because the wall is only 5 tiles high. Our heroes finally realize that the necessary additions are done modulo 5. What can you discover about this number system?

DOING THE ACTIVITY

What You Need: Copies of the activity page, pencils.

What To Do:

Step 1: You will need to be sure that students know something about addition modulo 5. Here is how it works. There are only 5 numbers, namely 1, 2, 3, 4, and 5. When you add two of these numbers together, the answer must also be 1, 2, 3, 4, or 5. For example, use the "clock" shown (following) to find 3 + 4. Start at 3 and move clockwise 4 steps. Since you land on 2, 3 + 4 = 2.

Step 2: Distribute copies of the activity page, MOD MATH. Help individuals as necessary.

Step 3: Toward the end of class, lead a group discussion.

a. **Did anyone notice anything special about the number 5?**

b. **Can anyone invent a reasonable definition of multiplication modulo 5?**

c. **What about subtraction?**

FOLLOW UP

Make a "clock" with 7 numbers instead of 5. Prepare an activity page similar to this one using your own problems.

MATHNET
FOUNDED 1985

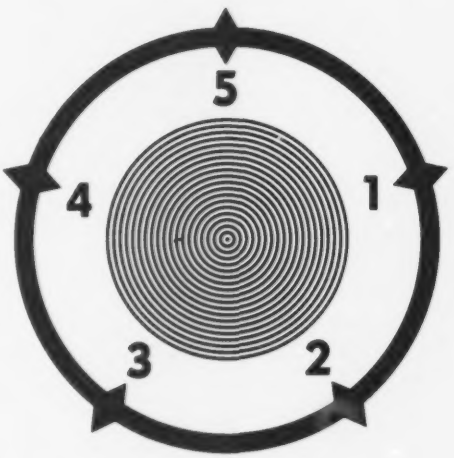
"to cogitate and to solve"

Mathematician _____

Date _____

MOD MATH

$2+2=\square$
$2+3=\square$
$1+3=\square$
$5+4=\square$
$1+5=\square$
$3+1=\square$
$1+2=\square$
$2+4=\square$
$4+4=\square$
$4+3+4=\square$



$1+\square=2$
$1+\square=5$
$4+\square=1$
$\square+3=2$
$\square+2=2$
$\square+4=2$

$3+3+3=\square$
$2+2+2=\square$
$2+2+2+2=\square$
$3+3=\square$
$4+4+4+4=\square$

What number, must be added to itself to make 1? $\square$

How many 4's must be added together to make 2? $\square$

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THE CASE OF THE

MISSING AIR

Mathnet's on the robbery detail, trying to find a pattern in a series of retail store heists. Four different chains have been hit, but a computer search doesn't yield much data. In most cases, the robber talked like a duck, and the timing of these robberies fell into a peculiar pattern. Kate and George find a new connection between the crimes. The chains all recently discontinued advertising on K-YUCK radio's controversial Byle Dupe Show. Dupe would be a strong suspect, but he has an alibi—the robberies took place during his live call-in show. Our heroes go undercover at a 10-4 store, where they tune into a fatal flaw in Dupe's alibi. A segment of the show is *prerecorded*, leaving Dupe free to commit the robberies. Good planning—until he tries to rob Mathnet's stakeout!

Book 'Em!

Krause, Eugene. *Taxicab Geometry: An Adventure in Non-Euclidean Geometry*. New York: Dover, 1986.

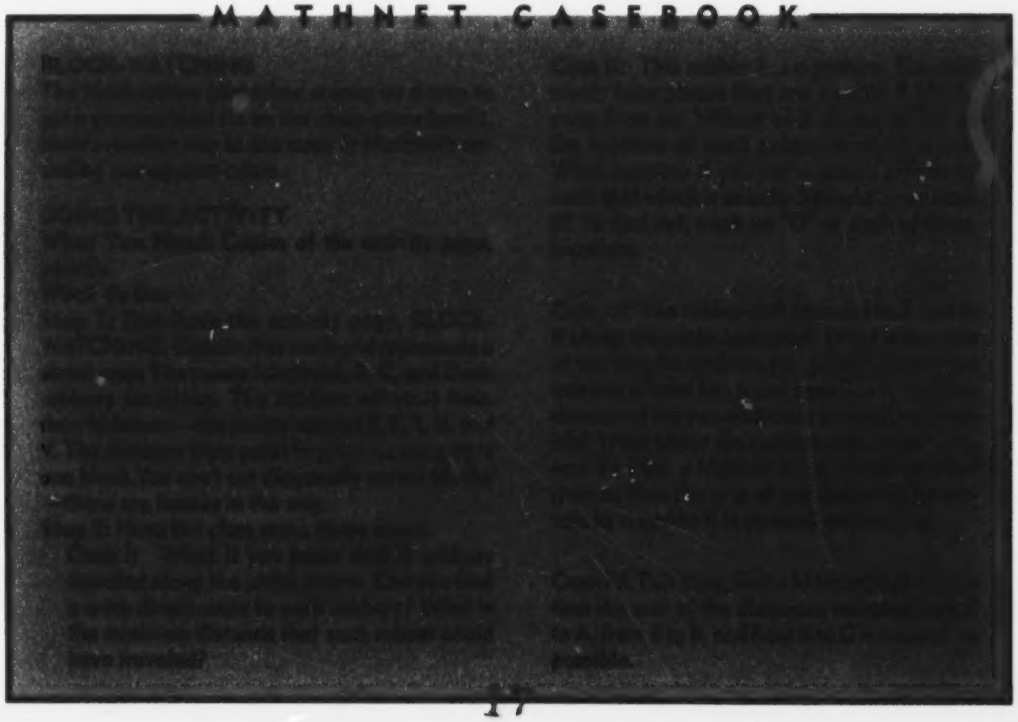
DATA FILE Tuesday: The Mathnetters face a rash of robberies—21, and it's only Tuesday. Debbie totaled the "take"—so far, the robber has more than $100,000. Kate sees almost immediately that the average is around $5,000. Presumably she rounded 21 down to 20 before doing the division. How would Kate estimate the following?

50,123 ÷ 5	48,005 ÷ 12	1,000,392 ÷ 1,028	98 × 1,044
100,000 ÷ 102	4,983 ÷ 51	52 × 21	49,209 × 20

DATA FILE Wednesday: Hair salons, gas stations, fast-food stores—they are all being robbed. And the team is having a hard time finding what the robberies have in common. Debbie points out that each store rents employee uniforms from the same service. But Kate isn't surprised. Stay-Pressed Uni is the only service in the area, so the probability that they'd all use it is one.

If you toss a die, what is the probability that the number which faces up is 1, 2, 3, 4, 5, or 6? What is the probability that the number which faces up is 2½? If you pick a card from an ordinary deck, what is the probability that it is either black or red? Can you color a die so that the probability that it comes up red is zero? Make a list of events that have a probability of one. Make a list of events with a probability of zero.

MATHNET CASEBOOK



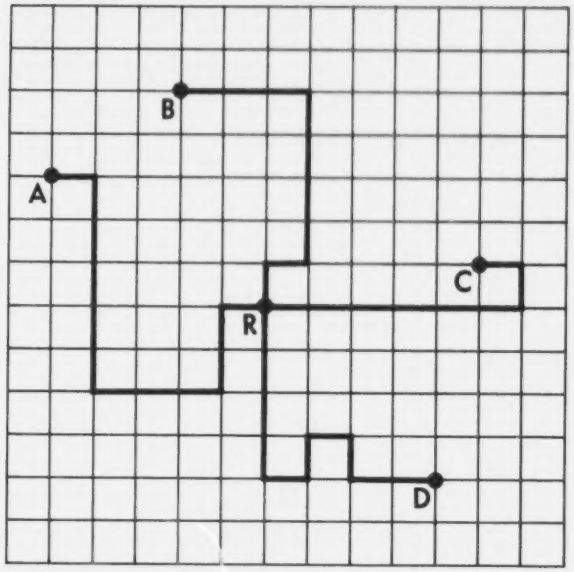
"to cogitate and to solve"

Mathematician

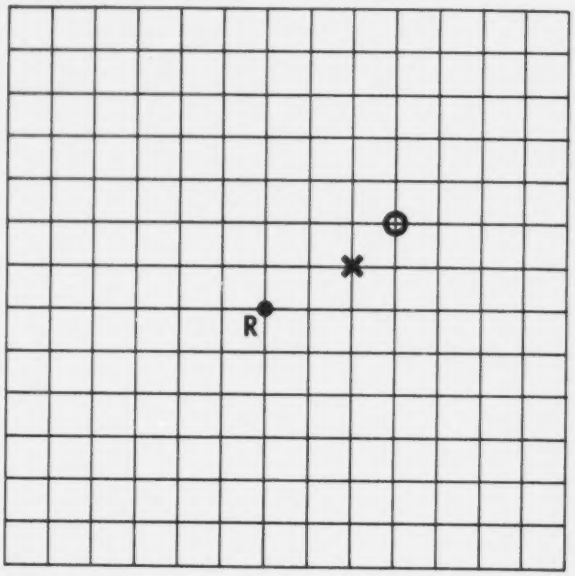
Date

Block-Watching

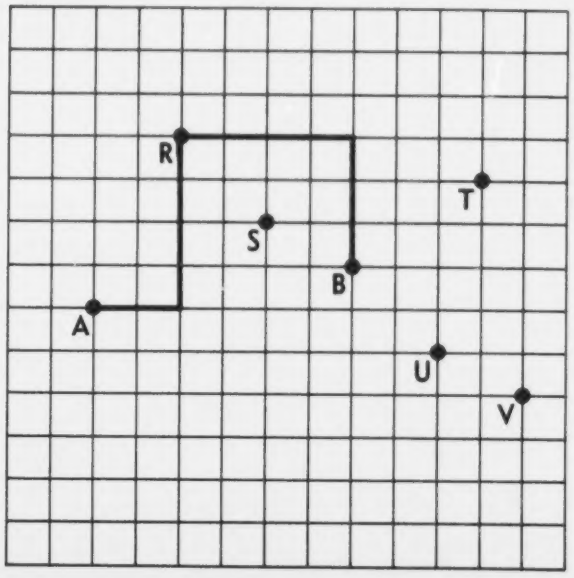
Case I



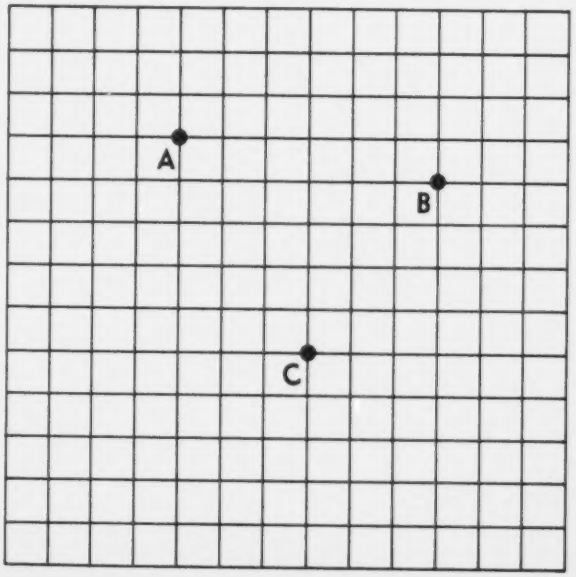
Case II



Case III



Case IV



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THE PROBLEM OF THE

MISSING MONKEY

Just the Facts

Mathnet investigates a case of monkey business—a series of robberies seemingly committed by a gorilla. The main suspect is Grunt, a prize gorilla missing from the zoo. But Grunt's pal Jane Rice Burroughs says that the thief is taking things a real gorilla wouldn't need—like money. When two different gorillas are sighted at the same time, the Mathnetters begin to suspect Janos Prokedsian, Grunt's former owner, who had recently rented a gorilla suit. As they play "What If" to pull their facts together, they learn that a gorilla has returned to the zoo. What George doesn't know is that it isn't Grunt. When he tries to apprehend what he believes to be Prokedsian, he finds himself facing a real —and really annoyed —gorilla.

Book 'Em!

Schoen, Harold, and Zweng, Marilyn, eds. *Estimation and Mental Computation: 1986 Yearbook.* Reston, Virginia: National Council of Teachers of Mathematics, 1986.

DATA FILE Monday: The gorilla first steals 20 pounds of bananas from a grocery store. The stock boy figures in his head that, at 49 cents per pound, approximately 10 dollars worth of bananas slipped away. How did he come to that conclusion? Discuss the various mental processes he might have used. Students can keep track of arithmetic problems which arise in their daily lives. For example, how much would a dozen pens cost at 26 cents a pen? Discuss and keep track of the alternative ways to approximate the answers. Paper, pencil, and calculators are NOT ALLOWED.

DATA FILE Tuesday: Did Grunt break out of his zoo cage—or was he *let out?* The cage lock was open, and the Mathnetters figure it has 46,656 possible combinations. Let's face it, the odds are against Grunt finding the combination on his own. Not all combination locks are that tough, though. Have the class bring in several locks. Which one would be the hardest to open by chance? Students can write descriptions of the locks with explanations of why they are easy or hard to open.

MATHNET CASEBOOK

FOOD FOR THOUGHT

While tracking Grunt down, the Mathnetters got a look at his food chart—60% Fruits and Vegetables, 30% Grains, and 10% Dairy products. Imagine that you've just been put in charge of designing a zoo. You have a daily ration of fruit and vegetables, grain, and dairy, and you know how much each kind of animal eats. As long as they don't eat too much, you can have any combination of animals that you like.

DOING THE ACTIVITY

What You Need: Copies of the activity page, pencils.

What To Do:

Step 1: Distribute copies of the activity page, FOOD FOR THOUGHT.

Step 2: Explain the problem to the class—you are choosing animals for a zoo. The amount that each animal eats daily is listed next to its name. (The amounts are fibs—but they're short.) There's a limit, though. All your animals together can eat no more than 50 pounds of fruit and vegetables, 40 pounds of grain, and 30 pounds of dairy. That is all you can afford.

Step 3: Point out that there are many solutions to this problem. For starters, one is given in the chart: 3 aardvarks, 6 dingoes, and 10 flamingos would eat 46 pounds of fruit and vegetables, 32 pounds of grain, and 27 pounds of dairy. This is a pretty good solution—there's not that much food left over.

Step 4: Have the students find other solutions and list them in the chart.

FOLLOW UP

Does it make sense to talk about a *best* solution? Here are some things to think about.

- **Which solutions leave the least in the way of leftovers?**
- **Suppose a pound of fruit and vegetables costs 99 cents, a pound of grain costs 49 cents, and a pound of dairy costs $1.29—then which solutions waste the least money?**
- **If you like aardvarks, is an all-aardvark zoo a good idea?**

SQUARE ONE Television

PROGRAM GUIDE

This guide is a quick reference to the various segments of the daily shows on SQUARE ONE TV. Two seasons are represented, a total of 115 shows in all. The 1988-89 season features four exciting new game shows, the adventures of Dirk Niblick and the Math Brigade, along with new episodes of Mathnet, Mathman, and Backstage with Blackstone.

To assist you in identifying subject matter that fits with your lessons, each segment description is followed by a content code which is based on the SQUARE ONE TV Curriculum Goals (see Teacher's Guide pages 30-31). You can use this information to integrate segments into your lesson plans. Titles of the Mathnet episodes appear at the end of each show listing. Short pieces such as Warnings and Newsbreaks are not referenced in this guide.

You can also use this guide to get a sense of a whole show's contents before it is broadcast. (Broadcast schedules for each program can be obtained from your local PBS station.) Each show is identified by a show number noted here. You'll see the number on your TV screen near the beginning of the program.

SEASON I

WEEK ONE

Length ▸ Title and Description ▸ Content Areas

SHOW NUMBER 101

3:18 **Infinity:** Graphic suggestions of infinity — D1 B1
1:21 **Mathman:** Multiples of 3 — B2
2:23 **Phoner—The Answer Is 3:** Algorithm that always gives the answer 3 — D2 B1
4:41 **Battle of the Bulge Caterers—Sandwiches:** Combinations from 2 meats and 3 cheeses — E1 D2
1:27 **Oops! Subtraction 300 – 163:** Borrowing mistake in subtraction — A2 B1
3:25 **Perfect Squares:** Square numbers — B2 B1
1:59 **Bureau of Missing Numbers:** Attributes of 14 — B2 B1
8:05 **Mathnet: Problem of the Missing Monkey—1** — C3 D1

SHOW NUMBER 102

7:34 **Star Truck Blandstand:** Average not higher than highest score — F5 F6 F2 B1 B4
2:40 **Rappin' Judge:** Round-trip rate problem — B5 C2 B1
2:04 **Blackstone—Dime, Penny, Nickel:** Trick based on odd and even numbers — B3 B1

Length ▸ Title and Description ▸ Content Areas

2:34 **Nines:** Song/digits of multiples of 9 add up to 9 — B2 D2 B1
1:27 **The Map:** Estimating time/distance using map/scale — G4 C3 B1
9:40 **Mathnet: Problem of the Missing Monkey—2** — G4 C3 B1 E1

SHOW NUMBER 103

2:45 **Spade Parade: In Search of Yucca Puck—1:** Logic problem sorting out truth and lies — E3
1:19 **Mathman:** Decimals less than .5 — A4 D1
2:32 **Spade Parade: In Search of Yucca Puck—2**
2:05 **Less Than Zero:** Negative numbers — A6 D1
5:48 **But Who's Counting?:** Smallest 5-digit number — A2 D1 F4
1:32 **Data Headache II:** Pie chart — F6
1:58 **You Can Count on It:** Mathematics in the world — C1
8:18 **Mathnet: Problem of the Missing Monkey—3** — G4 B5

SHOW NUMBER 104 Major emphasis: Scale

6:25 **Tony and the Togas:** Roman numerals — A2
1:11 **Oops! Ruler:** Mistake in lining up a ruler — C2
4:30 **Wrong Building:** Importance of proper scaling — G4 C2
3:39 **Shoemaker & Elves:** Interpreting scale and ratio — G4 B5 A3
2:29 **Comic—Shrunken Toothbrush:** Confusion of scale — G4 B5
8:17 **Mathnet: Problem of the Missing Monkey—4**

SHOW NUMBER 105 Major emphasis: Percents

3:58 **Prime Time Programming Meeting:** Prime numbers — B2
2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4
:50 **Soda Shoppe:** Computing a tip and rounding up — A5 A4 B4
1:10 **Trout on Your Head:** Horizontal bar graph — F6 A5
6:54 **But Who's Counting?:** Largest sum of two 3-digit numbers — A2 D1 F4
10:01 **Mathnet: Problem of the Missing Monkey—5**

WEEK TWO

SHOW NUMBER 106 Major emphasis: Angles

6:08 **Robin Hood:** Odd and even numbers — B3 B1
1:45 **Cabot & Marshmallow—Hey Cabot:** Multiplying by zero — B1
1:15 **Person on the Street:** Dodecahedron — G6
:20 **Dance of the Geo Shapes:** Dodecahedron — G6 G1

PROGRAM GUIDE

Length ▸ Title and Description ▸ Content Areas

5:17 **But Who's Counting?:** Largest 5-digit number — A2 D1 F4
2:23 **Angle Dance:** Body movements illustrate angles — G6
3:00 **Playing the Angle:** Angles and arcs in basketball — G6 F4 C2 A3 A5
:19 **Pong Game:** Billiard geometry — G2 G6
6:27 **Mathnet: Case of the Missing Baseball–1** — G6 G4

SHOW NUMBER 107 Major emphasis: Percents

4:38 **Identity Crisis:** Attributes of zero — A2 A4 B1 D1
2:46 **Lemonade Stand in the Desert:** Percent and decimal relationships — A5 D1 A3
2:47 **Eight Percent of My Love:** Percentages and a pie chart — A5 F6
2:27 **Harry's Hamburger Haven:** Equivalent fractions/decimals/percents — A4 A5 A3
6:20 **Matinee Movie–Cartablanca:** Rounding up weights — B4 B1
1:52 **Yes, General, Sir:** Permutations of 3 items — E1
5:23 **Mathnet: Case of the Missing Baseball–2** — G4

SHOW NUMBER 108 Minor emphasis: Volume

3:38 **Suds–Popcorn:** Doubling dimensions octuples volume — C2 C1 D2
1:38 **Oops! Decimals:** Mistake lining up decimals in addition — A4 B1
2:20 **Cabot & Marshmallow–Wooden Candy Bars:** Different dimensions–same volume — C2 C1
1:56 **Country and Western Music Pitch:** Fractions — A3 D1
3:15 **Tessellations:** Tessellated patterns on the beach — G3 G6
5:33 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4
1:12 **Mathman:** Factors of 18 — B2
1:09 **Groaning Wall:** Mathematical riddles
6:17 **Mathnet: Case of the Missing Baseball–3** — F4 A9

SHOW NUMBER 109 Minor emphasis: Odd and Even Numbers

7:00 **Phoneymooners–Hole in the Wall:** Area of an irregular shape — C2 C1 G4 B1
3:47 **Navigator:** Using maps and tools to chart a course — C2 G4 G6
2:54 **Blackstone–Heads or Tails:** Coin trick involving parity — B3
3:33 **X...It's the Sign of the Times:** Multiplication symbol — B1
1:12 **Mathman:** Odd numbers — B3
7:42 **Mathnet: Case of the Missing Baseball–4** — B4 G4 C3 B5

Length ▸ Title and Description ▸ Content Areas

SHOW NUMBER 110 Major emphasis: Combinatorics

3:10 **Superguy: New Cape Caper–1:** Combinations of 3 belts and 3 capes — E1 D2 B1
1:23 **Dweezil–Combinatorics:** Defining combinatorics — E1
3:40 **Superguy: New Cape Caper–2**
2:18 **Mistakes:** Learning from mistakes
2:07 **Building Go Boom:** Calculating height — B1 C1
3:10 **Ice Cream Store–Calories:** Bar chart and percents — A5 A3 D1 F6
2:36 **Me and My Shadow:** Comparing 2 and 3 dimensions — G1 C2
6:41 **Mathnet: Case of the Missing Baseball–5** — G4 G6

WEEK THREE

SHOW NUMBER 111 Major emphasis: Probability

1:41 **Cabot & Marshmallow: Probability–1:** Probability of 1 — F1 D1
1:42 **On the Midway:** Unequal probability — F4 F1 A3
2:19 **Cabot & Marshmallow: Probability–2:** Probability of zero — F1
4:20 **Ghost of a Chance:** Probabilities in several situations — F1 F3
4:27 **Handshake Contest:** Triangular numbers — B2 D2 D1
2:02 **Blackstone–Mental Speller:** Trick based on counting letters — D2
9:51 **Mathnet: Problem of the Passing Parade–1** — B4 B1 B5 G4

SHOW NUMBER 112

5:38 **Paper Race:** Rounding up to estimate cost — B4 B1 A4
3:16 **Burger Pattern:** Triangular number pattern — D2 D1 B1
5:48 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers — A2 D1 F4
2:53 **It's a Palindrome:** Generating palindromes — A2
9:07 **Mathnet: Problem of the Passing Parade–2** — C3 G6 G4

SHOW NUMBER 113 Major emphasis: Fractions

1:15 **Groaning Wall:** Mathematical riddles
3:11 **Samurai Mathematician:** Comparing fractional pieces of board — D1 A3
3:22 **Diet Lite Wet:** Equivalent fractions/decimals/percents — A3 A5 A4
1:24 **Mathman:** Fractions equivalent to $\frac{1}{3}$ — A3

PROGRAM GUIDE

Length ▸ Title and Description ▸ Content Areas

2:24 **Action at the Fraction Bar:** Fraction vocabulary — A3 A4 A5
3:45 **Good Sports—Fractional Baseball:** Scoring ¼ for each base — A3 D1 B1
1:50 **Oops! Division 6 into 4212:** Place value mistake in division — A2 B1
10:06 **Mathnet: Problem of the Passing Parade—3** — C2

SHOW NUMBER 114 Major emphasis: Two-Dimensional Shapes

3:33 **Cabot & Marshmallow—What Is a Name:** Rate problem using logic — B4 B5 B1
4:27 **Whither Weather:** Averages — F2 B1 D1
2:32 **Square Song:** Geometric properties of squares — G6
1:27 **Person on the Street:** Rhombus — G6
3:05 **Blackstone—The Imagination Dice:** Algorithm always giving the answer 10 — D2 B3 B1
:24 **Dance of the Geo Shapes:** Cube — G6 G1
3:51 **In Search of the Giant Squid:** Scale on a submarine map — C1 G4
7:21 **Mathnet: Problem of the Passing Parade—4**

SHOW NUMBER 115

5:06 **Daddy Knows Different—Doubling:** Doubling a penny for 30 days — B1 A1 D2
2:27 **Problem Song:** Rate problem peeling apples — B5 A3 B1
1:12 **Tessellation Animation—Tile:** Tessellated pattern on a tile mosaic — G3 G6
6:41 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers — A2 D1 F4
1:10 **Data Headache I:** Bar chart — F6
9:01 **Mathnet: Problem of the Passing Parade—5** — D2 F4

WEEK FOUR

SHOW NUMBER 116 Major emphasis: Spatial Measurement

3:59 **I Love Lupy: Elephants—1:** Estimating room area — C3 C2 G4
1:41 **Frame the Cat:** Smaller units/more accurate measurement — C2 G1 C3
3:58 **I Love Lupy: Elephants—2**
2:58 **Countin' Out the Rhythm:** Counting beats in a musical measure — D2 B1
1:27 **Mathman:** Factors of 12 — B2
3:58 **Blackstone—The Coin Puzzle:** Coin trick based on order and logic — D2
8:35 **Mathnet: Trial of George Frankly—1**

SHOW NUMBER 117 Major emphasis: Area and Perimeter

:27 **Perimeter:** Perimeter of irregular shapes — C2 C1

Length ▸ Title and Description ▸ Content Areas

1:31 **Oops! Perimeter:** Mistake in calculating perimeter — C2 B1
5:01 **Bandanas:** Area and perimeter of rectangles — C2 G6
2:37 **Math Mimes:** Equal perimeters/different areas — C2
3:50 **Neighborhood Superspy:** Alphanumeric code — D2 D1
:30 **X-Rays:** Geometric shapes describe a sculpture — G6
3:21 **But Who's Adding?:** Select addends and give sums — B1 D1
8:52 **Mathnet: Trial of George Frankly—2** — B4 B5 C2

SHOW NUMBER 118 Major emphasis: Figurate Numbers

3:25 **Perfect Squares:** Square numbers — B2 B1
1:12 **Museum—1:** Painting square numbers — B2 G6
4:38 **Trojan Pie:** Triangular numbers — B2 D2 G6 B1
:57 **Museum—2:** Painting triangular numbers
1:46 **Groaning Wall:** Mathematical riddles
:49 **Museum—3:** Square and triangular numbers
4:35 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4
9:24 **Mathnet: Trial of George Frankly—3** — F4 A2

SHOW NUMBER 119 Major emphasis: Rounding

5:27 **Round Off:** Round to nearest 10, 100, or 1000 — B4 A2
1:21 **Cabot & Marshmallow—Round to Confound:** Inappropriate rounding — B4 B1
3:02 **Round It Off:** Rounding numbers — B4
2:48 **Blackstone—Move the Clip:** Trick using symmetry — G2
:30 **Romance of Geometry:** Two congruent triangles — G6
13:26 **Mathnet: Trail of George Frankly—4** — B1

SHOW NUMBER 120 Major emphasis: Prime Numbers

5:55 **Callous—Candy Box:** Prime number 101; sum of squares — B2 C2 B1
2:16 **Bureau of Missing Numbers:** Attributes of 101 — B2 B1 A1
2:42 **Prime Club:** Prime and nonprime numbers — B2
:55 **Square Dance:** Square number arrays — D2 B2 G6 G2
2:04 **Multiplication Rap:** Importance of multiplication — B2 B1
1:49 **Mathman:** Fractions less than ½ — D1 A3
9:30 **Mathnet: Trial of George Frankly—5** — B5

PROGRAM GUIDE

Length ▸ Title and Description ▸ Content Areas

WEEK FIVE

SHOW NUMBER 121 Major emphasis: Common Multiples

:11	**Hundred Square:** Common multiple of 15 and 18	B2 D2
5:00	**Clown School Investigation:** Common multiple of 15 and 18	B2 B1
5:32	**But Who's Counting?:** Largest sum of 2- and 3-digit numbers	A2 D1 F4
4:21	**Common-Multiple Man:** Common multiples of 12, 16, and 24	B2
2:05	**Less Than Zero:** Negative numbers	A6 D1
:26	**Pos vs. Neg Jousts–Paratroopers:** Adding positive and negative numbers	A6 B1
2:25	**Ratings War:** Double bar graph	F6 F5
6:35	**Mathnet: Problem of the Dirty Money–1**	

SHOW NUMBER 122

3:56	**Thirty-Two Divided by 5–1:** Arithmetic problem of men in a boat	B1 B4
:24	**Concave/Convex:** Concave and convex shapes	G6
2:02	**Thirty-Two Divided by 5–2:** Arithmetic problem of yards of material	B1 B4
:21	**Concave/Convex:** Concave and convex shapes	G6
2:58	**Thirty-Two Divided by 5–3:** Arithmetic problem of people and a bill	B1 B4 A4
4:00	**Blackstone–Name the Number:** Coin trick based on arithmetic	B3
:35	**Odd and Even Hands:** Odd and even numbers	B3
2:30	**Jenny Didn't Call:** Mathematical pattern of behavior	D2
9:24	**Mathnet: Problem of the Dirty Money–2**	A9 A3 G4 B5

SHOW NUMBER 123 Major emphasis: Area of Irregular Shapes

5:49	**King for a Day:** Dividing a trapezoid	G6
1:17	**Person on the Street:** Trapezoid	G6
2:29	**Trapezoid Monks:** Defining a trapezoid	G6
:58	**Mathman:** Even numbers	B3
2:22	**Daddy Knows Different: Lawn Mowing–1:** Area of irregular shape	C2 C4
3:07	**Roman Numeral Blues:** Roman numerals	A2
3:18	**Daddy Knows Different: Lawn Mowing–2**	
1:50	**Oops! Division 6 into 4212:** Place value mistake in division	A2 B1

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6:02	**Mathnet: Problem of the Dirty Money–3**	

SHOW NUMBER 124 Major emphasis: Factors and Primes

1:30	**Mathman:** Prime numbers	B2
:36	**Matinee Movie: Dialing for Factors–1:** Factors of 84	B2 B1
3:02	**Mr. Bland Builds His Dream House–1:** Rectangular window using 17 panes	B2 B1 G6
1:48	**Matinee Movie: Dialing for Factors–2**	
2:23	**Mr. Bland Builds His Dream House–2:** Rectangular window using 15 or 16 panes	
:18	**Matinee Movie: Dialing for Factors–3**	
1:49	**Bureau of Missing Numbers:** Attributes of 9	B2 B3
2:34	**Nines:** Song/digits of multiples of 9 add up to 9	B2 D2 B1
4:39	**But Who's Adding?:** Select addends and give sum	B1 D1
7:56	**Mathnet: Problem of the Dirty Money–4**	

SHOW NUMBER 125 Minor emphasis: Multiples

4:31	**Amazing Story of 9s–1:** Digits of multiples of 9 add up to 9	B2 D2 B1 A1
:20	**Dance of the Geo Shapes:** Hexahedron	G6 G1
1:03	**Amazing Story of 9s–2**	
:20	**Dance of the Geo Shapes:** Pentagonal pyramid	G6 G1
1:42	**Amazing Story of 9s–3**	
3:26	**Change Your Point of View:** Problem-solving heuristic	D2
2:44	**Blackstone–1 to 8 Mind Reading:** Trick involving odd numbers	B3 D2
2:40	**The Fraction Rap:** Defining fractions	A3 B1
8:41	**Mathnet: Problem of the Dirty Money–5**	A3

WEEK SIX

SHOW NUMBER 126 Major emphasis: Data Organization

1:10	**Data Headache III:** Line graph	F6
4:36	**Dragon Maintenance:** Pie chart	F6 A5
2:58	**Graph of Love:** Broken line graph	F6 D1
3:45	**Blackstone–A Card Trick Without Cards:** Trick based on inverse operations	D2 B1
3:18	**Infinity:** Graphic suggestions of infinity	D1 B1
:41	**Infinity (Infinite Regress):** Dynamic suggestion of infinite regress	D1 G2
10:18	**Mathnet: Mystery of the Maltese Pigeon–1**	B1 D1 G4

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SHOW NUMBER 127 Major emphasis: Scale

2:24 **Eagle Express: Tulsa–1:** Using a map scale to find distance — C1 G4 B1
2:14 **Draw a Map:** Making a map with landmarks and scale — G4 C2
4:22 **Eagle Express: Tulsa–2:** Importance of knowing proper scale
2:32 **Appliance Pull–1:** Measuring perimeter — C2 B1 G6 G4
2:04 **Fortune Teller:** Trick based on inverse operations — D2 B1
1:35 **Appliance Pull–2:** Measuring inside and outside perimeter
10:59 **Mathnet: Mystery of the Maltese Pigeon–2** — F4

SHOW NUMBER 128 Major emphasis: Probability

2:37 **Suds: Raffle Ticket–1:** Probability of 1/1000 — F1 A3 A2
1:15 **Person on the Street:** Dodecahedron — G6
:20 **Dance of the Geo Shapes:** Dodecahedron — G6 G1
2:12 **Suds: Raffle Ticket–2:** Using percentage to divide winnings — A3 F4 B1
2:18 **Grempod and Blotmo–Sponge Candy:** Probability of 1/4 — F1 A3
1:10 **Suds: Raffle Ticket–3:** Changing probability — A3
6:25 **Tony and the Togas:** Roman numerals — A2
2:04 **Blackstone–Dime, Penny, Nickel:** Trick based on odd and even numbers — B3 B1
8:19 **Mathnet: Mystery of the Maltese Pigeon–3**

SHOW NUMBER 129 Minor emphasis: Percent

3:25 **Perfect Squares:** Graphic suggestions of square numbers — B2 B1
1:27 **Oops! Subtraction 300–163:** Borrowing mistake in subtraction — A2 B1
6:20 **Matinee Movie–Cartablanca:** Rounding up weights — B4 B1
2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4
1:13 **Mathman:** Percentages less than 1/2 — A5 D1
3:51 **In Search of the Giant Squid:** Scale on a submarine map — C1 G4
7:05 **Mathnet: Mystery of the Maltese Pigeon–4**

SHOW NUMBER 130

5:18 **Phoneymooners–Juggling the Books:** Rearranging piles to find the average — F2 B1
:54 **Grocery Packing–1:** Noncomputational algorithm — D2
1:58 **You Can Count on It:** Mathematics in the world — C1
:55 **Grocery Packing–2**
:53 **Grocery Packing–3**
1:10 **Trout on Your Head:** Horizontal bar graph — F6 A5
1:05 **Grocery Packing–4**
4:11 **But Who's Adding?:** Select addends and give sums — B1 D1
9:27 **Mathnet: Mystery of the Maltese Pigeon–5**

WEEK SEVEN

SHOW NUMBER 131 Major emphasis: Place Value

2:25 **Mathematics R Us:** Place value holder — A2 D1
5:01 **Battle of the Bulge Caterers: Bonbons–1:** Place value to thousands place — A2
2:18 **Mistakes:** Learning from mistakes
5:23 **Battle of the Bulge Caterers: Bonbons–2**
:35 **Pos vs. Neg Jousts–The Wall:** Adding positive and negative numbers — A6 B1
1:34 **Dropped Coin:** Subtraction problem — B1
6:14 **Zero Pacs:** Multiplying by 10s — A2 B1
6:47 **Mathnet: Problem of the Trojan Hamburger–1** — F4

SHOW NUMBER 132 Major emphasis: Metric Measurement

2:56 **Eagle Express: Bemidji–1:** Using a map scale to find distance — C2 G4 B1
1:07 **Feet Into Meters:** Converting feet into meters — C1
3:43 **Eagle Express: Bemidji–2:** Triangular route between cities
3:20 **Metric Electric Lover:** Metric/standard system units — C1
4:33 **But Who's Adding?:** Select addends and give sums — B1 D1
10:55 **Mathnet: Problem of the Trojan Hamburger–2** — C2 B1 C3

SHOW NUMBER 133 Minor emphasis: Tessellations; Fibonacci Sequences

2:08 **Phoner:** Fibonacci sequence — B3 D2
2:33 **Blackstone–Lightning Calculator:** Number trick based on Fibonacci Sequence — B3 B1
1:17 **Mathman:** Percentages more than 1/2 — A5 D1
6:13 **King's Stooges:** Arranging tables of 4 for 20 people — C2 G6
1:04 **Person on the Street:** Tessellations — G3
3:15 **Tessellations:** Tessellations on the beach — G3 G6
1:33 **Tessellation:** Tessellation with sneakers/TVs — G3 D1

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9:01	**Mathnet: Problem of the Trojan Hamburger–3**	B1 C1 C3

SHOW NUMBER 134 Major emphasis: Percent

3:22	**Stephan's Stereo:** Equivalent fractions/decimals/percents	A5 A4 A3
5:47	**Welcome Back Blotter:** Illustrations of percent	A5 A4 A3
2:47	**Eight Percent of My Love:** Percentages and a pie chart	A5 F6
5:43	**But Who's Counting?:** Largest 5-digit number	A2 D1 F4
:32	**Side By Side:** Using your head to estimate	B4 B1
8:02	**Mathnet: Problem of the Trojan Hamburger–4**	

SHOW NUMBER 135 Minor emphasis: Rates and Ratios

1:14	**Don't Ratio Without It:** Ratios	B5
2:15	**Don't Be Nosey:** Ratios	B5 A3
3:05	**Blackstone–1089:** Algorithm always giving the answer 1089	D2 G2 B1
2:27	**Problem Song:** Rate problem peeling apples	B5 A3 B1
3:50	**Coatrack:** Logic problem pouring liquid	C1 C2
:31	**Double Star Polygon:** 5-point star and pentagon	G6
12:08	**Mathnet: Problem of the Trojan Hamburger–5**	

WEEK EIGHT

SHOW NUMBER 136 Major emphasis: Fractions

2:27	**Harry's Hamburger Haven:** Equivalent fractions/decimals/percents	A4 A5 A3
2:24	**Action on the Fraction Bar:** Fraction vocabulary	A3 A4 A5
6:18	**But Who's Multiplying?:** Select factors and give products	B1 B2 D1 F4
:17	**Mixed Numbers:** Graphic depiction of mixed numbers	A3 D1
3:43	**Dinner by the Dozen:** Using fractions to divide popsicles	A3 B5 B1
2:57	**Kubrick's Rube:** Computer program to suggest infinity	D1 D2
:30	**Snowflake:** Suggestion of a fractal	G2 G6
8:05	**Mathnet: Problem of the Missing Monkey–1**	C3 D1

SHOW NUMBER 137

6:46	**HBC Programming:** Bar graph	F6 F5 A3 F4
:58	**Man at Desk (Head Calculator):** Mental math	B1 B2
3:33	**X...It's the Sign of the Times:** Multiplication symbol	B1
4:16	**Blackstone–21 Card Trick:** Card manipulations and counting	A1
1:15	**Mathman:** Factors of 60	B2
:20	**Quadrilaterals:** Different quadrilaterals	G6
9:40	**Mathnet: Problem of the Missing Monkey–2**	G4 C3 B1 E1

SHOW NUMBER 138 Major emphasis: Parity

4:29	**Odd Numbers Strike:** Attributes of odd numbers	B3 D1
:34	**Odd/Even Bricks:** Patterns based on odd and even numbers	B3
2:36	**Math Rap:** Mathematics in the world	
5:17	**But Who's Counting?:** Largest 5-digit number	A2 D1 F4
:50	**Soda Shoppe:** Computing a tip and rounding up	A5 A4 B4
4:55	**Phoneymooners–In the Doghouse:** Odd and even numbers	B3 B1
8:18	**Mathnet: Problem of the Missing Monkey–3**	G4 B5

SHOW NUMBER 139 Major emphasis: Working Backwards (Problem Solving)

2:42	**So-Fari, So-Goodi-1:** Working backwards to solve a problem	D2 B1
:54	**Person on the Street:** Googol	A1
:22	**Googol:** The number one googol	A1 B1
1:43	**So-Fari, So-Goodi–2**	
:53	**Googol:** Discussing the number one googol	A1 B1
3:15	**So-Fari, So-Goodi–3**	
3:05	**So-Fari, So-Goodi–4**	
2:01	**Bureau of Missing Numbers:** Attributes of 10	B2 B1
3:16	**Burger Pattern:** Triangular number pattern	D2 D1 B1
8:17	**Mathnet: Problem of the Missing Monkey–4**	

SHOW NUMBER 140 Major emphasis: Probability

5:01	**Let's Do a Deal–1:** Probability	F1 A3
4:20	**Ghost of a Chance:** Probabilities in several situations	F1 F3
4:10	**Let's Do a Deal–2**	
2:16	**Blackstone–Card and Number:** Algorithm always giving answer of 18	D2 B1 B3
10:01	**Mathnet: Problem of the Missing Monkey–5**	

WEEK NINE

SHOW NUMBER 141 Major emphasis: Angles

4:10	**Moderately Frightening Stories:** Computer program that runs forever	D1 B3
1:09	**Mathman:** Multiples of 5	B2
5:40	**Battle of the Bulge Caterers–Trays:** Arranging sandwiches on a tray	C2 C4
2:47	**Forestry I:** Collecting data	F5 B4

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2:23 **Angle Dance:** Body movements illustrate angles — G6
3:00 **Playing the Angle:** Angles and arcs in basketball — G6 F4 C2 A3
:19 **Pong Game:** Billiard geometry — G2 G6
6:27 **Mathnet: Case of the Missing Baseball–1** — G6 G4

SHOW NUMBER 142 Major emphasis: Data Processing

2:08 **Pollster–1:** Nonrepresentative samples — F4 A5 F5 F6
3:26 **Forestry II:** Statistical sampling — C3 C2 F5 C1
2:05 **Pollster–2**
3:17 **Blackstone–Coin Mindreading:** Coin trick based on 9s — B1
1:39 **Pollster–3:** Representative samples
:42 **Hundred Squares Table:** Number patterns of multiples — B2 D2
3:50 **Neighborhood Superspy:** Alphanumeric code — D2 D1
3:14 **Top Secret No Peeking:** Parentheses in arithmetic problem — B1
5:23 **Mathnet: Case of the Missing Baseball–2** — G4

SHOW NUMBER 143 Major emphasis: Geometric Objects

3:20 **How to Build a Bridge–1:** Unstable line segment struts — G6
:16 **Juxtaposing the Angles of a Triangle:** Angles and degrees in triangles — G6
:58 **How to Build a Bridge–2:** Unstable rectangle
2:02 **Triangle Song:** Triangle shapes in the world — G6
:52 **How to Build a Bridge–3:** Stable right triangle supports
3:09 **Forestry III:** Trigonometry — C3 C2 G6 F5
3:26 **Mathematics R Us:** The cube — G1 G6
1:43 **Baloney:** Making a list of possible combinations — E1 F6
:31 **Bridge Montage:** Triangles in bridges — G6
5:48 **But Who's Counting?:** Smallest 5-digit number — A2 D1 F4
6:17 **Mathnet: Case of the Missing Baseball–3** — F4 A9

SHOW NUMBER 144 Major emphasis: Spatial Measurement

2:20 **Cabot & Marshmallow–Wooden Candy Bars:** Different dimensions –same volume — C2 C1
3:47 **Forestry IV:** Approximating volume — C2 C1 C3
1:51 **Oops! Decimals/Multiplication 4.3 x 2.6:** Wrong decimal point placement — A4 B1
3:48 **Queen's Bed:** Nonstandard units — C1 C2 D1
:57 **Mathman:** Multiples of 6 — B2

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2:58 **Countin' Out the Rhythm:** Counting beats in a musical measure — D2 B1
3:21 **But Who's Adding?:** Select addends and give sums — B1 D1
7:42 **Mathnet: Case of the Missing Baseball–4** — B4 G4 C3 B5

SHOW NUMBER 145 Major emphasis: Additivity

5:19 **Phoneymooners–At the Lodge:** Venn diagrams and additivity — F6 C4
3:06 **Forestry V:** Linear programming — C3 C2 G6 C4
1:11 **Oops! Ruler:** Mistake in lining up a ruler — C2
3:31 **Cosmic Carpets:** Measuring the same area twice — C4 C2 G4 G6
2:32 **Square Song:** Geometric properties of squares — G6
2:58 **Blackstone–Faceup, Facedown:** Logical card trick — B3
:24 **Pos vs. Neg Jousts–Taking a Break:** Adding positive and negative numbers — A6 B1
6:41 **Mathnet: Case of the Missing Baseball–5** — G4 G6

WEEK TEN

SHOW NUMBER 146 Major emphasis: Square Numbers

3:01 **Phoner:** Squaring 2-digit number ending in 5 — D2 B1
6:05 **Broadway:** Square number patterns — B2 D2 G6 B1
2:05 **Bureau of Missing Numbers:** Attributes of 36 — B2 B1 A4
:55 **Square Dance:** Square number arrays — D2 B2 G6 G2
3:25 **Perfect Squares:** Graphic suggestions of square numbers — B2 B1
1:27 **The Map:** Estimating time/distance using map/scale — G4 C3 B1
9:51 **Mathnet: Problem of the Passing Parade–1** — B4 B1 B5 G4

SHOW NUMBER 147 Major emphasis: Rounding

2:28 **Mathematics R Us:** Rounding — B4 D1 A4
:25 **Stick Squares I:** Dividing a square into square units — G6
3:02 **Round It Off:** Rounding numbers — B4
2:40 **Artist's License:** Doubling dimensions quadruples area — C2 D2
1:10 **Area (6 x 8):** Area of a rectangle — C2
1:20 **Five-Nineteen Blues:** When to round numbers — B4
6:26 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers — A2 D1 F4
9:07 **Mathnet: Problem of the Passing Parade–2** — C3 G6 G4

SHOW NUMBER 148 Minor emphasis: Multiplication

1:27 **Mathman:** Factors of 24 — B2
5:37 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4

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1:13 **Oops! Multiplication 603 x 7:** Mistake multiplying with zero — B1
2:07 **Birthday Party:** 56 people at 7 tables — B1
2:30 **Jenny Didn't Call:** Mathematical pattern of behavior — D2
2:39 **Blackstone–Magic Social Security Number:** Cyclic permutations — D2 B1
:32 **Number Pattern:** Cyclic number — D2
10:06 **Mathnet: Problem of the Passing Parade–3** — C2

SHOW NUMBER 149 **Major emphasis: Functions**

3:48 **Mathematics R Us:** Function machine — D2
1:21 **Mathman:** Multiples of 3 — B2
1:00 **Doin' Nothin I:** Multiplying/dividing by 1 — D2 B1
6:41 **Celebrity Kitchen:** Function machine — D2 B1 A4 A3
1:06 **Doin' Nothin II:** Adding/subtracting zero — D2 B1
1:56 **Cabot & Marshmallow–Sq. Pegs in Rd. Holes:** Rotational symmetry — G2
2:34 **Nines:** Song/digits of multiples of 9 add up to 9 — B2 D2 B1
:23 **Rotational Symmetry:** Rotational symmetry of a star — G2
7:21 **Mathnet: Problem of the Passing Parade–4**

SHOW NUMBER 150

4:21 **I Love Lupy: Packing Licorice–1:** One-dimensional packing — C2 B1 B2
:31 **Pos vs. Neg Jousts–Straight Ahead:** Adding positive and negative numbers — A6 B1
4:39 **I Love Lupy: Packing Licorice–2**
4:32 **Sugar Ray Sketch:** Weighing a dog — C2 B1
2:56 **Think About the Problem:** Problem-solving heuristics — D1
9:01 **Mathnet: Problem of the Passing Parade–5** — D2 F4

WEEK ELEVEN

SHOW NUMBER 151 **Minor emphasis: Pentominoes**

7:16 **But Who's Counting?:** Largest difference 2- and 3-digit numbers — A2 D1 F4
:57 **Person on the Street:** Pentomino — G6
2:27 **Joke in the Box:** Open-top boxes from pentominoes — G6 G1
1:33 **Pentominoes:** 12 possible arrangements of a pentomino — G2 G6
3:46 **Really Gross Profit:** Pay bills before calculating profit — B1

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2:05 **Perpendicular Lines:** Examples in the world — G6
8:35 **Mathnet: Trial of George Frankly–1**

SHOW NUMBER 152

4:29 **Mike Merv Show:** Angles and parabola of football flight — G6 F6
2:16 **Average American:** Statistical averages — F2
2:55 **Blackstone–The Elimination Game:** Card game involving logic — B3
:58 **Mathman:** Even numbers — B3
3:30 **Life Raft:** Zero divided by non-zero number is zero — B1
:40 **Multiply by Zero:** Multiplying by zero — B1 A1
2:40 **Rappin' Judge:** Round-trip rate problem — B5 C2 B1
8:52 **Mathnet: Trial of George Frankly–2** — B4 B5 C2

SHOW NUMBER 153 **Major emphasis: Place Value**

7:56 **Willy Glutton Bank Robber:** Dividing by regrouping numbers — A2 B1 A1
1:58 **You Can Count on It:** Mathematics in the world — C1
4:35 **But Who's Mutliplying?:** Select factors and give products — B1 B2 D1 F4
:25 **Tetrahedron:** Tetrahedron shape — G1 G6
2:14 **Zero Pacs:** Multiplying by 10s — A2 B1
9:24 **Mathnet: Trial of George Frankly–3** — F4 A2

SHOW NUMBER 154 **Minor emphasis: Palindromes**

3:56 **Bobo's Dilemma:** Logic problem using geometry — G6 C2
1:22 **Person on the Street:** Palindrome — A2
2:53 **It's a Palindrome:** Attributes of a palindrome — A2
:35 **Palindrome:** Generating palindromes — A2 D2 B1
:47 **Groaning Wall:** Mathematical riddles
3:08 **Blackstone–The Magic Spells:** Trick based on logic and counting — D2 B2
:30 **Pos vs. Neg Jousts–The Abyss:** Adding positive and negative numbers — A6 B1
13:26 **Mathnet: Trial of George Frankly–4** — B1

SHOW NUMBER 155 **Major emphasis: Quadrilaterals**

5:49 **King for a Day:** Dividing a trapezoid — G6
1:15 **Mathman:** Multiples of 4 — B2
1:09 **Person on the Street:** Quadrilaterals — G6
2:55 **An Interesting Game of Football:** Irregularly shaped quadrilaterals — C2 C3 G6 G4
:20 **Quadrilaterals:** Quadrilateral shapes — G6
2:40 **The Fraction Rap:** Defining fractions — A3 B1

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9:30 **Mathnet: Trial of George Frankly–5** B5

WEEK TWELVE

SHOW NUMBER 156

4:55 **Spade Parade: Fishy Anchovy–1:** Chart used to solve logic problem F6
2:39 **More Than One Way:** Ways to solve problems
2:42 **Spade Parade: Fishy Anchovy–2**
1:12 **Mathman:** Factors of 8 B2
4:12 **Gypsy Rose Amicable:** Amicable numbers B2 B1
:41 **Stick SquaresIII:** Dividing a square into square units G6
3:05 **Blackstone–Cups:** Logic problem of parity and observation B3
6:35 **Mathnet: Problem of the Dirty Money–1**

SHOW NUMBER 157 Major emphasis: Scale

3:23 **Scales on the Brain–1:** Change in scale G4 B5 A3
2:14 **Draw a Map:** Making a map with landmarks and scale G4 C2
1:22 **Scales on the Brain–2:** Handshake ratio of 1 to 500
5:33 **But Who's Multiplying?:** Select factors and give products B1 B2 D1 F4
4:03 **Gingerman Sketch:** Dividing a bill B1 F2
:50 **Soda Shoppe:** Computing a tip and rounding up A5 A4 B4
9:24 **Mathnet: Problem of the Dirty Money–2** A9 A3 G4 B5

SHOW NUMBER 158 Major emphasis: Data Processing

2:06 **Callous: The Survey–1:** Collecting and organizing data F5 F6 A5 F4
1:10 **Data Headache I:** Bar graph F6
3:57 **Callous: The Survey–2**
1:32 **Data Headache II:** Pie chart F6
2:57 **Callous: The Survey–3**
1:13 **Mathman:** Percentages less than ½ A5 D1
1:50 **Smokestacks Go Boom:** Thirds A3
1:09 **Counting the Elephants:** Broken line graph F5 F6
2:58 **Graph of Love:** Broken line graph F6 D1
1:10 **Data Headache III:** Line graph F6
6:02 **Mathnet: Problem of the Dirty Money–3**

SHOW NUMBER 159

5:54 **The Duelists:** Taxi geometry G4 C1 G6
2:04 **Phoner–Consecutive Odd Numbers:** Add to get square number B3 B2 B1
2:08 **Shape Up:** Geometric shapes and vocabulary G6

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6:52 **But Who's Counting?:** Largest sum of 2 3-digit numbers A2 D1 F4
1:35 **Pop Up Book:** Dimensionality G1
7:56 **Mathnet: Problem of the Dirty Money–4**

SHOW NUMBER 160 Minor emphasis: Large Numbers

:24 **Pos vs. Neg Jousts–Taking a Break:** Adding positive and negative numbers A6 B1
2:05 **Less Than Zero:** Negative numbers A6 D1
5:04 **Million Dollar Giveaway:** $1,000,000 for 20,000 people A1 C3 B1 C1
:54 **Person on the Street:** Googol A1
:53 **Googol:** Discussing the number googol A1 B1
2:48 **Blackstone–Move the Clip:** Trick using symmetry G2
:39 **Groaning Wall:** Mathematical riddles
4:23 **Set Up (Mandrell Concert):** Mathematics in setting up a concert D1
8:41 **Mathnet: Problem of the Dirty Money–5** A3

WEEK THIRTEEN

SHOW NUMBER 161 Minor emphasis: Permutations

4:20 **Photograph All About It:** Possible orders of 2, 3 4, and 5 things E1 B1
3:26 **Change Your Point of View:** Problem-solving heuristic D2
1:49 **Multi-Gloves:** Different combinations of 5 colors E1
:16 **Concentric Circles** G6
4:39 **But Who's Adding?:** Select addends and give sums B1 D1
:27 **Number Pattern:** 9 x 1 + 2 = 11, and so on D2 B1
1:19 **Mathman:** Decimals less than .5 A4 D1
10:18 **Mathnet: Mystery of the Maltese Pigeon–1** B1 D1 G4

SHOW NUMBER 162 Minor emphasis: Rates

5:57 **Superguy–Flying Down to Freezo:** Functions; converting money units B5 D2 B1
:60 **John Moschita–Robin Hood:** Living graph F5 F6 B5 D2
2:27 **Problem Song:** Rate problem peeling apples B5 A3 B1
5:32 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers A2 D1 F4
10:59 **Mathnet: Mystery of the Maltese Pigeon–2** F4

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SHOW NUMBER 163 Major emphasis: Probability

1:41 **Cabot & Marshmallow: Probability–1:** Probability of 1 — F1 D1
2:50 **Grempod and Blotmo–Alien Visit:** Changing probabilities — F1 A3 D1
1:12 **Mathman:** Odd numbers — B3
2:19 **Cabot & Marshmallow: Probability–2:** Probability of zero — F1
4:20 **Ghost of a Chance:** Probabilities in several situations — F1 F3
4:50 **Tuesday Noon Football:** Probabilities of ½ — F1 A3
1:11 **Tessellation Animation–Quilt:** Tessellations on a quilt — G3 G6
8:19 **Mathnet: Mystery of the Maltese Pigeon–3**

SHOW NUMBER 164 Major emphasis: Functions Coding

4:35 **Spade Parade: Missing Michael Angelo–1:** Logic problem involving code — F4 F5 F6
3:25 **Mathematics R Us–1:** Wordsworth table — D2 B1
6:35 **Spade Parade: Missing Michael Angelo–2**
:13 **Mathematics R Us–2**
:20 **Dance of the Geo Shapes:** Triangular prism — G6 G1
3:50 **Neighborhood Superspy:** Alpha-numeric code — D2 D1
:20 **Dance of the Geo Shapes:** Hexahedron — G6 G1
7:05 **Mathnet: Mystery of the Maltese Pigeon–4**

SHOW NUMBER 165 Major emphasis: Infinity, Parity

2:57 **Kubrick's Rube:** Computer program to suggest infinity — D1 D2
3:18 **Infinity (Song):** Graphic suggestions of infinity — D1 B1
:41 **Infinity (Infinite Regress):** Dynamic suggestion of infinite regress — D1 G2
:35 **Odd and Even Hands:** Odd and even numbers — B3
4:14 **Odd Pair:** Adding odd and even numbers — B3 B1
1:11 **Moebius Trip:** Demonstrating one-sided Moebius strip — G6 G7
:49 **Moebius Trip:** One-sided car trip — G6 G7
2:54 **Blackstone–Heads or Tails:** Coin trick involving parity — B3
9:27 **Mathnet: Mystery of the Maltese Pigeon–5**

WEEK FOURTEEN

SHOW NUMBER 166 Major emphasis: Multiples and Factors

:12 **Hundred Square:** Common multiples of 8 and 12 — B2 D2
5:08 **Multiple Pizzas:** Lowest common multiple 8 and 12 — B2 A3
:12 **Multiples of 8 and 12:** Multiples of 8 and 12 on a 100 grid — B2 D2
3:33 **X...It's the Sign of the Times:** Multiplication symbol — B1
:30 **Factor Tree:** Prime factors of 300 — B2 B1
5:33 **Factor Tree:** Prime factors of different numbers — B2 B1
3:46 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4
:57 **Mathman:** Multiples of 6 — B2
6:47 **Mathnet: Problem of the Trojan Hamburger–1** F4

SHOW NUMBER 167 Minor emphasis: Tessellations

5:14 **Mathwoman and the Boy Number–1:** One-dimensional packing with boards — C2 B1 B2
:21 **Number Pattern–1:** Multiples of 3 and 37 — B2 D2
1:04 **Person on the Street:** Tessellations — G3
3:15 **Tessellations:** Tessellations on the beach — G3 G6
3:19 **Mathwoman and the Boy Number–2**
:21 **Number Pattern–2** — D2
2:02 **Blackstone–Mental Speller:** Trick based on counting letters — D2
10:55 **Mathnet: Problem of the Trojan Hamburger–2** — C2 B1 C3

SHOW NUMBER 168 Major emphasis: Fractions

3:54 **Mathematics R Us:** Fraction reducing machine — A3 D1
1:24 **Mathman:** Fractions equivalent to ⅓ — A3
2:45 **Sloppy Kitchen Commercial:** Fractions equivalent to ⅕ — A3
:42 **Stick Squares II:** Dividing a square into square units — G6
2:24 **Action at the Fraction Bar:** Fraction vocabulary — A3 A4 A5
4:11 **But Who's Adding?:** Select addends and give sums — B1 D1
:32 **Overlapping Squares:** Squares in a 4 x 4 array — C4 G6
1:35 **Cabot & Marshmallow–What Day Is It?:** Fractional parts of a week — A3 B1
9:01 **Mathnet: Problem of the Trojan Hamburger–3** — B1 C1 C3

SHOW NUMBER 169 Major emphasis: Area and Perimeter

2:23 **Angle Dance:** Body movements illustrate angles — G6
4:40 **How Does Your Garden Grow?:** Area, perimeter, and scale — C2 G4
3:16 **Burger Pattern:** Triangular number pattern — D2 D1 B1
7:06 **McMath:** Finding largest area of a rectangle — C2 G6 B1
:58 **Mathman:** Even numbers — B3
8:02 **Mathnet: Problem of the Trojan Hamburger–4**

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SHOW NUMBER 170 Minor emphasis: Percents

3:56 **Spade Parade: Foul Ball–1:** Logic problem — B3 B2
2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4
4:40 **Spade Parade: Foul Ball–2**
2:27 **Harry's Hamburger Haven:** Equivalent fractions/decimals/percents — A4 A5 A3
12:08 **Mathnet: Problem of the Trojan Hamburger–5**

WEEK FIFTEEN

SHOW NUMBER 171 Minor emphasis: Metric Measurement

1:11 **Oops! Ruler:** Mistake in lining up a ruler — C2
3:17 **Mathematics R Us:** Tape measure for perimeter — C2 C1 G6
3:20 **Metric Electric Lover:** Metric/standard system vocabulary — C1
1:03 **Symmetry Patterns:** Repeating symmetrical pattern — G2 G6
4:27 **Counting the House:** Counting the same section twice — C4 B1
4:33 **But Who's Adding?:** Select addends and give sums — B1 D1
8:35 **Mathnet: Trial of George Frankly–1**

SHOW NUMBER 172

1:12 **Mathman:** Factors of 18 — B2
5:37 **Harry & Elmo:** Efficient counting by grouping — C2 B1
2:56 **Think About the Problem:** Problem-solving heuristics — D1
2:34 **Bert and Ernie–Dog:** Cost of raising a dog — B4 B2
:33 **Pos vs. Neg Jousts–2 on 1:** Adding positive and negative numbers — A6 B1
3:03 **Blackstone–Miraskill-Candies:** Trick based on even numbers — B3 A2
1:42 **Plant a Spoon–1:** 3 seeds give 2 spoons the same color — D2
8:52 **Mathnet: Trial of George Frankly–2** — B4 B5 C2

SHOW NUMBER 173 Major emphasis: Logical Thinking

5:20 **Spade Parade: Des Moines Duck –1:** Chart used to solve logic problem — F6
3:49 **Spade Parade: Des Moines Duck–2**
1:09 **The Sale:** Finding percent from a discount — A5 B1 A3
2:47 **Eight Percent of My Love:** Percentages and a pie chart — A5 F6
3:10 **Sinbad and the 20 Coins:** Logic problem with different solutions — B3
9:24 **Mathnet: Trial of George Frankly–3** — F4 A2

SHOW NUMBER 174

3:57 **Very Nice:** Logic problem dividing up pails of milk — A3 B1
:24 **Groaning Wall:** Mathematical riddles
:23 **Perpendicular Lines** — G6
2:05 **Perpendicular Lines:** Examples in the world — G6
:47 **Groaning Wall**
2:25 **Cat, Bird, Kibble–1:** Classical logic problem — E3
:10 **John Moschita–Peter Piper:** Living graph of rate of speed — F5 F6 B5 D2
1:42 **Cat, Bird, Kibble–2**
13:26 **Mathnet: Trial of George Frankly–4** — B1

SHOW NUMBER 175

2:30 **Hold It Nobody Eat–1:** Fractions of a pie — A3
1:20 **Five-Nineteen Blues:** When to round numbers — B4
1:05 **Hold It Nobody Eat–2**
1:34 **Dropped Coin:** Subtraction problem — B1
:40 **Hold It Nobody Eat–3**
:20 **Number Pattern:** Sum of consecutive odd numbers — D2 B2
4:05 **Arthur Benjamin–Squaring II:** Shortcuts for squaring numbers — B1 A1
2:58 **Countin' Out the Rhythm:** Counting beats in a musical measure — D2 B1
2:13 **Sale!:** Rearranging digits to get lowest sum — A2 B1
9:30 **Mathnet: Trial of George Frankly–5** — B5

SEASON II

WEEK ONE

SHOW NUMBER 201

6:43 **Square One Squares:** Game of mathematical misconceptions — B5 C2 F6 G2 G4
5:39 **Dirk Niblick: Fool Most of the People–1:** Discount isn't as advertised — A5
3:14 **One Billion Is Big:** Relative sizes of million and billion — A1 A2
2:35 **Dirk Niblick: Fool Most of the People–2**
:21 **Number Pattern 37:** A simple number pattern — D2
8:44 **Mathnet: Case of the Willing Parrot–1** — C2 D2 G4

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SHOW NUMBER 202 Minor emphasis: Estimation

1:01 **Dirklet:** Estimation — B4
3:51 **Estimation:** Song about the usefulness of estimation — C3
7:43 **Close Call:** Estimation game — C1 C3
:35 **Multiply by Zero:** Product of any number and zero is zero — B1 A1
:26 **Spot the Quadrilaterals:** Identifying quadrilaterals among polygons — G6
1:39 **Mathman:** Polygons that are rectangles — G6
12:06 **Mathnet: Case of the Willing Parrot–2** — A5 D2 F1 F4 G6

SHOW NUMBER 203

3:18 **Blackstone–Crossed Out Numbers:** Trick based on numbers in a 4 x 4 array — D2
6:02 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
3:41 **Combo Jombo:** Combinatorics — B1 E1
1:18 **Mathman:** Square numbers — B2
12:13 **Mathnet: Case of the Willing Parrot–3** — B3 G6

SHOW NUMBER 204

5:39 **Triple Play:** Geometric strategy game — B1 G6
4:34 **Dirk Niblick–Illegal Lawyer–1:** Error in adding fractions — A3
2:23 **Phoner–The Answer Is 1:** Algorithm that always gives the result 1 — B1 D2
2:20 **Dirk Niblick: Illegal Lawyer–2**
1:15 **Groaning Wall:** Mathematical riddles
11:03 **Mathnet: Case of the Willing Parrot–4** — B3

SHOW NUMBER 205 Major emphasis: Modular Arithmetic

1:45 **Mathman:** Multiplying by 5 and adding 2 — B2 B3
4:40 **Blackstone–5-Envelope Spelling:** Trick based on remainders — D2
1:22 **Calvin Klein Boy:** Defining combinatorics — E1
3:31 **Time Keeper:** Song about clock arithmetic — B3
1:32 **Data Headache II:** Using a pie chart — F6
11:58 **Mathnet: Case of the Willing Parrot–5** — B1 B3 D2

WEEK TWO

SHOW NUMBER 206

5:31 **Dirk Niblick: To Heck and Back–1:** Distance, rate, and time — C2 C3
1:37 **Mathman:** Fractions greater than 1 — A3

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2:20 **Dirk Niblick: To Heck and Back–2**
6:54 **Close Call:** Estimation game — A5 C1 C2
:15 **Mixed Numbers 4/3:** Graphic depiction of mixed numbers — A3 D1
3:42 **Prime Numbers:** Song about prime numbers — B2 B3
:23 **Prime Numbers:** Prime numbers on a 100 grid — B2
:41 **Square One Puzzler:** How many rectangles are in the diagram? — G6
5:43 **Mathnet: Case of the Great Car Robbery–1** — A5 B4 F5 F6

SHOW NUMBER 207

3:45 **Blackstone–Magic Safari:** Trick based upon counting — D2
8:07 **Square One Squares:** Game of mathematical misconceptions — A2 C4 D1 G2 G6
:41 **Stick Squares III:** Dividing a square into square units — G6
1:09 **Mathman:** Multiples of 5 — B2
2:36 **Me and My Shadow:** Comparing 2 and 3 dimensions — G1 C2
10:39 **Mathnet: Case of the Great Car Robbery–2** — A5 B4 F2 F5 F6

SHOW NUMBER 208

5:48 **Triple Play:** Geometric strategy game — B1 G6
1:17 **Dirklet–Use Graphs:** Problem-solving heuristic
1:37 **OOPS! 1/2 + 1/3 = 2/5:** Common mistake in adding fractions — B1 A3
4:21 **Common-Multiple Man:** Common multiples of 12, 16, and 24 — B2
1:33 **Mathman:** Polygons that are pentagons — G6
2:56 **Archimedes:** Inventions and discoveries of Archimedes
9:39 **Mathnet: Case of the Great Car Robbery–3** — B5 F5 F6

SHOW NUMBER 209

4:58 **Dirk Niblick: The Lint Trap–1:** Miscalculation of proper wages — B3
1:58 **You Can Count on It:** Mathematics in the world — C1
2:48 **Dirk Niblick: The Lint Trap–2**
:26 **Spot the Hexagons:** Identifying hexagons among polygons — G6
5:27 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
1:21 **Cabot & Marshmallow–Round to Confound:** Inappropriate rounding — B4 B1
10:31 **Mathnet: Case of the Great Car Robbery–4** — B1 B4 B5 F6

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SHOW NUMBER 210 Minor emphasis: Numerical Patterns

2:12 **Phoner–The Answer Is 6:** Algorithm that always gives the result 6 — B1 D2
1:46 **Dirklet–Look for a Pattern:** Problem-solving heuristic — D2
3:10 **Blackstone–Liar and Truthteller:** Logic is used to determine who has coin
1:43 **Baloney:** Making a list of possible combinations — E1 F6
1:29 **Mathman:** Solutions to $19 - C < 5$ — B1 D1 D4
15:24 **Mathnet: Case of the Great Car Robbery–5** — B4 B5 F2 F5 F6

WEEK THREE

SHOW NUMBER 211

7:02 **Square One Squares:** Game of mathematical misconceptions
6:07 **Dirk Niblick: Do Not Fold, Spindle–1:** 3 60-minute tapes vs. 2 90-minute tapes — B5
2:04 **LessThan Zero:** Negative integers — A6 D1
2:45 **Dirk Niblick: Do Not Fold, Spindle–2**
9:33 **Mathnet–Case of the Deceptive Data–1** — A3 B4 F1

SHOW NUMBER 212

:53 **Dirk Niblick: Go West Young Math–1:** Redistribution of land is necessary — C2 D2
1:59 **Bureau of Missing Numbers:** Attributes of 14 — B2 B1
:10 **Dirk Niblick: Go West Young Math–2**
:26 **Mathman:** $\frac{3}{8} + \frac{5}{8} = 1$ — A3
15:33 **Mathnet: Case of the Deceptive Data–2** — A5 B4 F1 F5 F6

SHOW NUMBER 213

:47 **Dirklet:** Equilateral Triangles — G6
2:23 **Angle Dance:** Body movements illustrate angles — G6
4:20 **Triple Play:** Geometric strategy game — B1 G6
1:25 **Mathman:** Polygons that are parallelograms — G6
:58 **Man at Desk (Head Calculator):** Mental arithmetic — B1 B2
17:20 **Mathnet: Case of the Deceptive Data–3** — F1 F2 F5 F6

SHOW NUMBER 214

7:00 **Close Call:** Estimation game — A5 C1 C3 F3
2:20 **Blackstone–Number Affinity:** Blackstone demonstrates a number trick — B1 D2
2:23 **Phoner–The Answer Is 3:** Algorithm that always gives the answer 3 — D2 B1
14:10 **Mathnet–Case of the Deceptive Data–4** — C3 F5 F6

SHOW NUMBER 215

1:25 **Mathman:** Polygons that are quadrilaterals — G6
2:55 **Think About the Problem:** Problem-solving heuristics — D1
5:19 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
14:48 **Mathnet–Case of the Deceptive Data–5** — A5 B4

SHOW NUMBER 216 Minor emphasis: Numerical Patterns

2:51 **Blackstone–Magic Dice:** Sum of opposite faces of a die is 7 — D2
1:19 **Dirklet–Order of Multiplication:** Multiplying whole numbers in any order — B1
:52 **Square One Squares:** Game of mathematical misconceptions — A3 D1 F1 F3 G6
:19 **Number Pattern:** Square numbers — D2 B2
3:25 **Perfect Squares:** Graphic suggestions of square numbers — B2 B1
12:30 **Mathnet–View from the Rear Terrace–1** — B4 B5 F5 F6

SHOW NUMBER 217

6:06 **Dirk Niblick: Mall or Nothing at Mall–1:** Biased survey leads to problems — A5 F5
6:42 **Close Call:** Estimation game — C1 C3
:21 **Number Pattern 37:** A simple number pattern — D2
2:38 **Dirk Niblick: Mall or Nothing at Mall–2**
:41 **Palindrome:** Create palindromes — A2 B1 D2
11:09 **Mathnet–View from the Rear Terrace–2** — A5 B4 F2 F5 F6

SHOW NUMBER 218 Minor emphasis: Numerical Functions

5:36 **Dirk Niblick–Itty Bitty Business–1:** Misplaced decimal points cause problems — A4 A5
2:57 **Kubrick's Rube:** Computer program to suggest infinity — D1 D2
:35 **Mathman:** $\frac{1}{3} + \frac{2}{3} = 1$ — A3
2:59 **Dirk Niblick: Itty Bitty Business–2**
2:01 **Perpendicular Lines:** Examples of perpendicular lines — G6
2:03 **Phoner–The Answer Is 5:** Algorithm that always gives the result 5 — B1 D2

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1:42 **OOPS! 34 x 12:** Multiplication algorithm mistake — B1

9:32 **Mathnet: View from the Rear Terrace–3** — A5 B4 F5 F6

SHOW NUMBER 219

6:09 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6

2:46 **Blackstone–13 Turns:** Trick based upon parity of turned die — B3

:34 **Pos vs. Neg Jousts–The Wall:** Adding positive and negative numbers — A6 B1

16:58 **Mathnet: View from the Rear Terrace–4** — A5 B1 F2

SHOW NUMBER 220

2:40 **Rappin' Judge:** Round-trip rate problem — B5 C2 B1

4:41 **Triple Play:** Geometric strategy game — B1 G6

18:17 **Mathnet: View from the Rear Terrace–5**

WEEK FIVE

SHOW NUMBER 221

6:25 **Tony and the Togas:** Roman numerals — A2

4:34 **Dirk Niblick: Illegal Lawyer–1:** Error in adding fractions — A3

1:23 **The Map:** Estimating time/distance using map/scale — G4 C3 B1

2:20 **Dirk Niblick: Illegal Lawyer–2**

2:45 **Spade Parade: In Search of Yucca Puck–1:** Logic problem sorting truth from lies — E3

:14 **Sum of the Angles of a Triangle:** Juxtaposing the angles of a triangle — G6

2:32 **Spade Parade: In Search of Yucca Puck–2**

1:13 **Mathman:** Decimals greater than ½ — A4 D1

5:46 **Mathnet: Case of the Missing Air–1** — C3

SHOW NUMBER 222 Major emphasis: Arithmetic of 9s

8:31 **Close Call:** Estimation game — C1 C2 C3

4:31 **Amazing Story of 9s–1:** Digits of multiples of 9 add up to 9 — B2 D2 B1 A1

:18 **Multiples of 9:** Multiples of 9 on a 100 grid — B2

1:03 **Amazing Story of 9s–2:** Digits of multiples of 9 add to 9

1:37 **Dirklet–Divisible by 9:** Divisibility test for nine — B1

1:42 **Amazing Story of 9s–3**

:28 **Double Star Polygon:** Symmetry — G6

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2:34 **Nines:** Song/digits of multiples of 9 add up to 9 — B2 D2 B1

6:35 **Mathnet: Case of the Missing Air–2** — C3 F5

SHOW NUMBER 223

3:22 **Blackstone–Dice and Cards:** Trick based on the roll of the dice — D2

:21 **Pos vs. Neg Jousts–Paratroopers:** Adding positive and negative numbers — A6 B1

2:00 **Triangle Song:** Triangle shapes in the world — G6

6:33 **Triple Play:** Geometric strategy game — B1 G6

:52 **Person on the Street–Hypotenuse:** Define "hypotenuse" — G6

13:46 **Mathnet: Case of the Missing Air–3** — D1 F1 F4 F5 F6

SHOW NUMBER 224 Minor emphasis: Percents

7:00 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6

5:39 **Dirk Niblick: Fool Most of the People–1:** Discount isn't as advertised — A5

:28 **Mathman:** 45% + 55% = 100% — A5

2:35 **Dirk Niblick: Fool Most of the People–2**

2:47 **Eight Percent of My Love:** Percentages and a pie chart — A5 F6

:18 **Parallel/Not Parallel:** Parallel vs. nonparallel — G6

8:30 **Mathnet: Case of the Missing Air–4** — G4

SHOW NUMBER 225

9:29 **Square One Squares:** Game of mathematical misconceptions — B5 F4 F6 G2 G6

3:15 **Blackstone–Quarter Parity:** Coin trick based on parity — B3

1:45 **Mathman:** Solutions to $3 + X > 10$ — A4 B1 D1 D4

:46 **Multiples of 8 and 12:** Multiples of 8 and 12 on a 100 grid — B2

:49 **Soda Shoppe:** Computing a tip and rounding off — A5 A4 B4

8:40 **Mathnet: Case of the Missing Air–5** — F6

WEEK SIX

SHOW NUMBER 226

1:18 **Dirklet–Divisible by 5:** Divisibility test for 5 — B1

3:13 **Blackstone–Turning the Die:** Trick based on pattern of turned die — B3 D2

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2:25 **Ratings War:** Double bar graph — F6 F5
6:10 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
2:11 **Draw a Map:** Making a map with landmarks and scale — G4 G4 C2
11:47 **Mathnet: Case of the Map with a Gap–1** — A4 B4 E3 G2 G5

SHOW NUMBER 227

3:51 **Estimation:** Song about the usefulness of estimation — C3
6:24 **Square One Squares:** Game of mathematical misconceptions
2:18 **Grempod and Blotmo–Sponge Candy:** Probability of ¼ — F1 A3
2:27 **Harry's Hamburger Haven:** Equivalent fractions/decimals/percents — A4 A5 A3
1:45 **Dirklet–Number Trick:** Simple trick with whole numbers — A2
:25 **Spot the Pentagons:** Identify pentagons among polygons — G6
10:04 **Mathnet: Case of the Map with a Gap–2**

SHOW NUMBER 228 Minor emphasis: Triangles

1:09 **Dirklet: Paper and Pencil–1**
2:50 **Phoner–The Answer Is 2:** Algorithm that always gives the result 2 — B1 D2
3:05 **Blackstone:** Algorithm always giving the answer 1089 — D2 G2 B1
5:24 **Triple Play:** Geometric strategy game — B1 G6
3:02 **Average American:** Statistical averages — F2
12:17 **Mathnet: Case of the Map with a Gap–3** — B5 C1 C2 G4 G6

SHOW NUMBER 229

8:14 **Close Call:** Estimation game — A5 C1 C2
1:25 **Mathman:** Polygons that are hexagons — G6
5:31 **Dirk Niblick: To Heck and Back–1:** Distance, rate, and time — C2 C3
1:18 **Five-Nineteen Blues:** When to round numbers — B4
2:20 **Dirk Niblick: To Heck and Back–2** — G2
8:08 **Mathnet: Case of the Map with a Gap–4**

SHOW NUMBER 230 Minor emphasis: Numeration

3:31 **Time Keeper:** Song about clock arithmetic — B3
4:58 **Dirk Niblick: The Lint Trap–1:** Miscalculation of proper wages — B3
:31 **Rotational Symmetry** — G2
1:36 **Mathman:** Polygons with a line of symmetry — G2

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2:48 **Dirk Niblick: The Lint Trap–2**
:25 **Decimals/Percents/Fractions–25%:** Equivalence: decimal, fraction, percent — A5 A3 A4
3:22 **Diet Lite Wet:** Equivalent fractions/decimals/percents — A3 A5 A4
:58 **Square One Puzzler–Calendar:** What day is 20 days from Wednesday? — B3
7:58 **Mathnet–Case of the Map with a Gap–5** — C1 C2 G4 G6

WEEK SEVEN

SHOW NUMBER 231

7:31 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
6:07 **Dirk Niblick: Do Not Fold, Spindle–1:** 3 60-minute tapes vs. 2 90-minute tapes — B5
:20 **Area:** Determine area of rectangular figure — C1 C2
2:45 **Dirk Niblick: Do Not Fold, Spindle–2**
1:43 **Mathman:** Solutions to $T + 40 < 75$ — A4 B1 D1 D4
8:44 **Mathnet: Case of the Willing Parrot–1** — C2 D2 G4

SHOW NUMBER 232

3:41 **Combo Jombo:** Combinatorics — B1 E1
1:33 **Dirklet–Make a Drawing:** Problem-solving heuristic
1:10 **Data Headache I:** Using a bar chart — F6
5:27 **Square One Squares:** Game of mathematical misconceptions
:24 **Polyhedrons–1:** Illustrating a tetrahedron — G6 G1 G2
2:04 **Blackstone–Dime, Penny, Nickel:** Trick based on odd and even numbers — B3 B1
:41 **Infinity (Infinite Regress):** Dynamic suggestion of infinite regress — D1 G2
12:06 **Mathnet: Case of the Willing Parrot–2** — A5 D2 F1 F4 G6

SHOW NUMBER 233 Minor emphasis: Fibonacci Sequence

1:01 **Dirklet: Close Call Promo/Estimation** — B4
4:20 **Ghost of a Chance:** Probability in several situations — F1 F3
5:45 **Close Call:** Estimation game — A5 C1 C2 C3
1:32 **Mathman:** Solutions to $20 > A + 5$ — A4 B1 D1 D4
:28 **Polyhedrons–2:** Illustrating a cube, a hexahedron — G6 G1 G2

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2:08 **Phoner–Fibonacci Sequence:** Fibonacci sequence trick — B3 D2
12:13 **Mathnet: Case of the Willing Parrot–2** — B3 G6

SHOW NUMBER 234

5:53 **Dirk Niblick: Go West Young Math–1:** Redistribution of land is necessary — C2 D2
1:13 **Tessellation Animation–Tile:** Tessellation leads to a tile design — G3 G6
3:10 **Dirk Niblick: Go West Young Math–2**
:27 **Mathman:** Extra Short
:25 **Stick Squares I:** Divide a square into square units — G6
4:32 **Sugar Ray Sketch:** Weighing a dog — C2 B1
:42 **Stick Squares II:** Divide a square into square units — G6
11:03 **Mathnet: Case of the Willing Parrot–4** — B3

SHOW NUMBER 235

3:14 **One Billion Is Big:** Relative sizes of million and billion — A1 A2
:47 **Dirklet: Triple Play Promo/Triangles** — G6
:19 **Pong Game:** Billiard geometry — G2 G6
6:15 **Triple Play:** Geometric strategy game — B1 G6
1:39 **Mathman–Square Numbers:** Square numbers — B2
:48 **Square One Puzzler–Salary:** Which is more, .5 or .25? — A3 A4 D1
1:07 **The Sale:** Finding percent from a discount — A5 B1 A3
11:58 **Mathnet: Case of the Willing Parrot–2** — B1 B3 D2
2:00 **Closing**

WEEK EIGHT

SHOW NUMBER 236

1:29 **Mathman:** Solutions to $19-C<5$ — B1 D1 D4
6:37 **Triple Play–Playoff:** Geometric strategy game — B1 G6
6:06 **Dirk Niblick: Mall or Nothing at Mall–1:** Biased survey leads to problems — A5 F5
3:03 **Blackstone–Miraskill-Candies:** Trick based on even numbers — B3 A2
2:38 **Dirk Niblick: Mall or Nothing at Mall–2**
1:08 **Person on the Street–Combinatorics:** Define combinations — E1
:30 **Pos vs. Neg Jousts–The Abyss:** Adding positive and negative numbers — A6 B1

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5:43 **Mathnet: Case of the Great Car Robbery–1** — A5 B4 F5 F6

SHOW NUMBER 237

3:42 **Prime Numbers:** Song about prime numbers — B2 B3
7:05 **Close Call:** Estimation game — C1
1:46 **Dirklet–Look for a Pattern:** Problem-solving heuristic — D2
1:30 **Mathman:** Solutions to $7 + P < 7$ — A6 B1 D1 D4
2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4
10:39 **Mathnet: Case of the Great Car Robbery–2** — A5 B4 F2 F5 F6

SHOW NUMBER 238

7:36 **Square One Squares:** Game of mathematical misconceptions
5:36 **Dirk Niblick: Itty Bitty Business–1:** Misplaced decimal points cause problems — A4 A5
1:30 **OOPS! 804 – 236:** Borrowing mistake in subtraction — B1 A2
2:59 **Dirk Niblick: Itty Bitty Business–2**
9:39 **Mathnet: Case of the Great Car Robbery–3** — B5 F5 F6

SHOW NUMBER 239 Major emphasis: Data Presentation

3:10 **Ice Cream Store–Calories:** Bar chart and percents — A5 A3 D1 F6
3:12 **Tessellations:** Tessellations on the beach — G3 G6
1:40 **Dirklet–Divisible by 3:** Divisibility test for 3 — B1
5:48 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
:13 **Mixed Numbers $3\frac{1}{2}$:** Graphic depiction of mixed numbers — A3 D1
1:10 **Data Headache III:** Using a broken line graph — F6
1:17 **Mathman:** Percentages more than $\frac{1}{2}$ — A5 D1
10:31 **Mathnet: Case of the Great Car Robbery–4** — B1 B4 B5 F6

SHOW NUMBER 240

1:31 **Dirklet: Compare Fractions ($\frac{1}{3}$, $\frac{1}{4}$)** — A3 D1
4:40 **Blackstone–5-Envelope Spelling:** Tricks based on remainders — D2
2:56 **Archimedes:** Inventions and discoveries of Archimedes
1:37 **Mathman:** Fractions greater than 1 — A3
15:24 **Mathnet: Case of the Great Car Robbery–5** — B4 B5 F2 F5 F6
2:00 **Closing**

MATHNET
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"to cogitate and to solve"

Mathematician _____

Date _____

Food for thought

Aardvark

Bear

Caribou

Dingo

Elephant

Flamingo

Gorilla

Hippo

	1 Animal Eats			EXAMPLE				New Zoo				Zoo Two				Ka-Zoo			
	Fruits & Vegetables	Grain	Dairy	Number of Animals	F	G	D	Number of Animals	F	G	D	Number of Animals	F	G	D	Number of Animals	F	G	D
Aardvark	2	4	1	3	6	12	3												
Bear	7	0	0																
Caribou	0	6	0																
Dingo	0	0	4	6	0	0	24												
Elephant	24	0	2																
Flamingo	4	2	0	10	40	20	0												
Gorilla	5	3	2																
Hippo	0	10	7																
TOTALS					46	32	27												
GOALS					50	40	30		50	40	30		50	40	30		50	40	30

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THE PROBLEM OF THE

PASSING PARADE

Who stole Steve Stringbean? Mathnet must find the kidnapped rock star in time for a huge parade in his honor. They have a witness—Rimshot, a young fan who hid in the van during the kidnapping. He leads the Mathnetters to an abandoned hideout, where they find a clue—unusual tire tracks left by an antique car. A phoned-in ransom demand features a brief message sung by Steve: "Please do what these people say." But as he sings, his voice goes flat. It's another clue—the notes make up the kidnappers' phone number. A data base search connects the number and the antique car from the hideout with the address of unsuccessful composer John Phillips Lousa. The Mathnetters find a ton of horrible marches—and one bound-and-gagged superstar.

Book 'Em!

Elementary Science Study. *Ice Cubes: Teacher's Guides.* New York: McGraw-Hill, 1975.

DATA FILE Tuesday: Rimshot had a scary ride when the kidnappers got Steve. Hidden in the back of the van, he couldn't see the road, but he kept track of the route by counting to himself and noting turns. On the playground, one at a time, have your students close their eyes and walk, following these instructions: 1) count to 5 and then make a left turn, 2) count to 7 and then make a right turn, 3) count to 3 and then make another right. After they make the second right have them go straight ahead to a count of 7, stop, and then mark the spot. How widely scattered are the marks? What caused problems?

DATA FILE Thursday: When the kidnappers make their ransom demand, they want exactly $104,020—a weird amount. But the delivery method they demand is even weirder—the money must be frozen in a 350-pound block of ice and dropped in the ocean. The Mathnetters know that the rate at which the ice will melt depends in part on the temperature of the ocean. Exactly how is the speed at which ice melts related to the temperature of the water it floats in? To find out, fill four containers with water of different temperatures—say, 60 degrees, 80 degrees, 100 degrees, and 120 degrees. Drop an ice cube in each and time how long it takes to melt. Does the rate also depend on the shape of the ice? Are there any other factors? Have the class conduct the necessary experiments.

MATHNET CASEBOOK

CROWD CONTROL

When Steve Stringbean comes to town, the crowds really turn out. Thad Green, Mathnet's Chief, needs to know how many people will show up for the parade. Can you help estimate the crowd size?

DOING THE ACTIVITY

What You Need: Copies of the activity page, pencils, rulers.

What To Do:

Step 1: Distribute copies of the activity page, CROWD CONTROL.

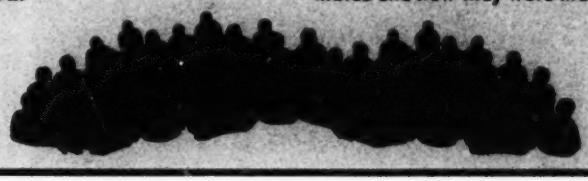
Step 2: Help the students estimate the "crowd" in each of the 4 maps. Each map has differently shaped blocks and different crowd densities.

Step 3: Encourage the students to do the estimation in more than one way.

Step 4: Lead a group discussion about the various processes that were used.

FOLLOW UP

See if you can locate newspaper articles in which there are references to estimates of the size of a crowd. See if you can find out who made the estimates and how they were made.



MATHNET
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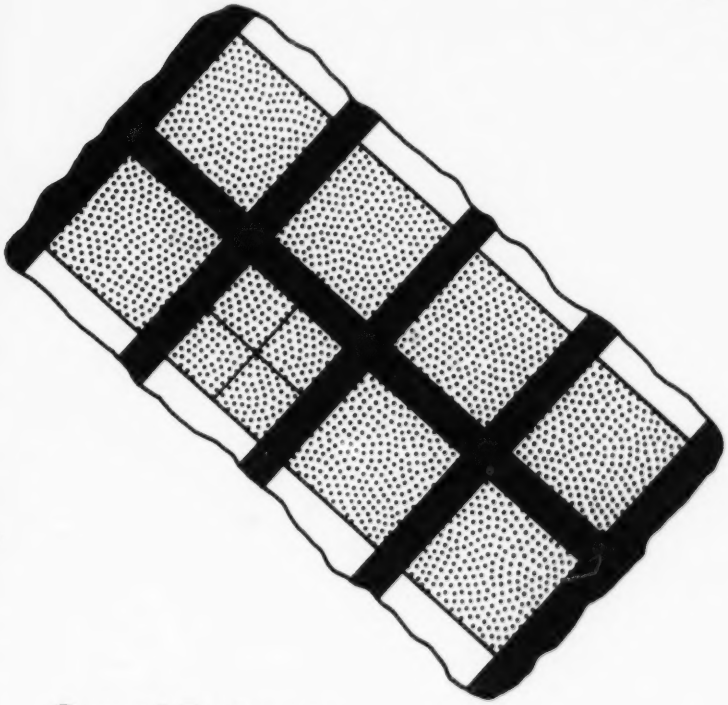
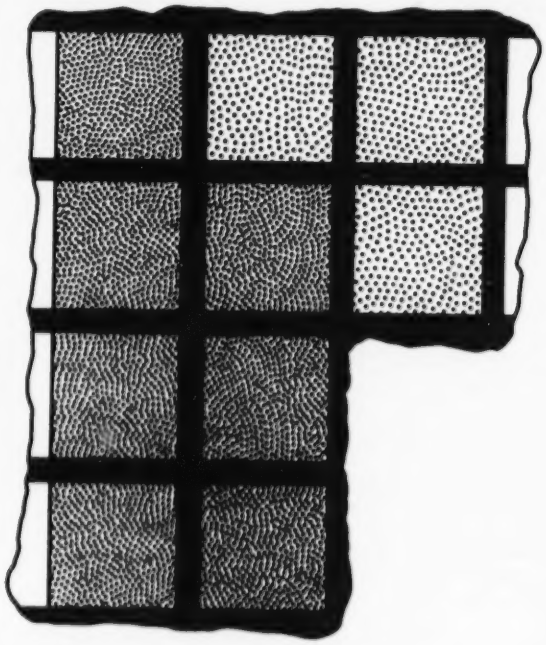
Mathematician

Date

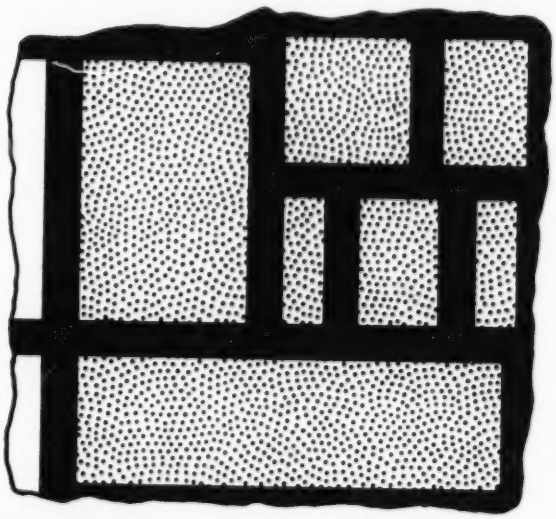
CROWD CONTROL



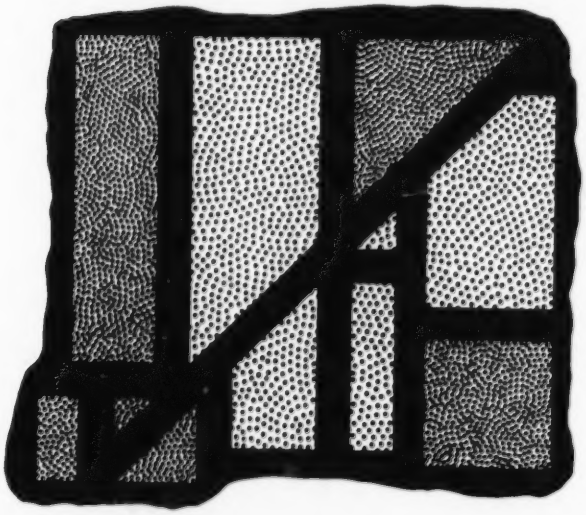
Crowd Estimate ____



Crowd Estimate ____



Crowd Estimate ____



Crowd Estimate ____

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THE PROBLEM OF THE

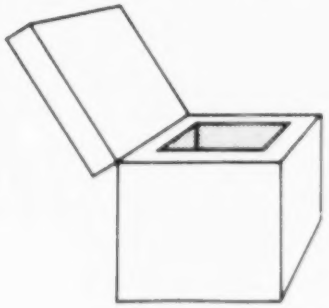
TROJAN HAMBURGER

Mathnet investigates a case of kidnapping when jack-of-all-trades Hans Ballpeen is abducted for his "special skills." Then a huge wooden hamburger mysteriously appears on millionaire Orson Kane's front lawn. The Mathnetters estimate the weight of the strange sculpture to get it placed in Kane's museum. But they're back the next day—Kane's priceless "Despair Diamond" has been stolen. The gem thief got into the mansion by hiding in the wooden burger (which turns out to be hollow) and escaped via balloon. Next, the kidnapped Hans turns up, claiming he was forced to cut up a large diamond. Suspicious, Kate and George investigate and find that Hans used many abilities to pull off the gem heist. But even with his "special skills," Hans is caught red-handed.

Book 'Em!

Picciotto, Henri. *The Math Machine: Pentomino Puzzles.* Oak Lawn, Illinois: Creative Publications, 1984.

DATA FILE Monday: Hans Ballpeen needed a pretty big box for his Trojan Hamburger. The burger had to be large enough for him to hide in, so its box was enormous (6 feet by 6 feet by 4 feet) and made of oak. To calculate the most it could weigh, Kate and George assume that the box is solid and that oak weighs no more than 55 pounds per cubic foot. But suppose that the box isn't solid—it has walls which are one foot thick. What's the maximum weight now?



Follow Up: Suppose we know that a solid box has a volume of 144 cubic feet, but don't know its dimensions. Is 6 feet x 6 feet x 4 feet the only possibility? How many others can you find?

DATA FILE Wednesday: The Despair Diamond weighs 227.1 carats—impressive to a jeweler, yet this million-dollar diamond weighs 45 grams, about the same as only 9 nickels. What are some other specialized units of measurement? Rods? Nautical miles? Light-years? Have the class develop a list and find everyday equivalents. Who uses these units and why?

MATHNET CASEBOOK

FOLDING FOR ANSWERS

The Trojan Hamburger in its box just popped up on Orson Kane's lawn. Suppose the Mathnetters had to make it—by folding a single sheet of paper. Use some geometrical thinking to figure which of the flat designs on the activity page can be cut out and folded into a box.

DOING THE ACTIVITY

What You Need: Copies of the activity page, scissors.

What To Do:

Step 1: Distribute copies of the activity page, FOLDING FOR ANSWERS.

Step 2: On the top half of the page are several pentominoes. Some of them can be folded into an open box with no lid, others cannot. Cut them out to see which ones work, and which don't.

Step 3: On the bottom of the page there are several hexominoes. Find those which can be folded into closed boxes.

FOLLOW UP

Altogether there are 12 pentominoes—8 of them are shown on the activity page. Have students use graph paper to discover and draw the rest. Which ones fold into open boxes? Similarly, there are 35 hexominoes altogether. How many can the class find?

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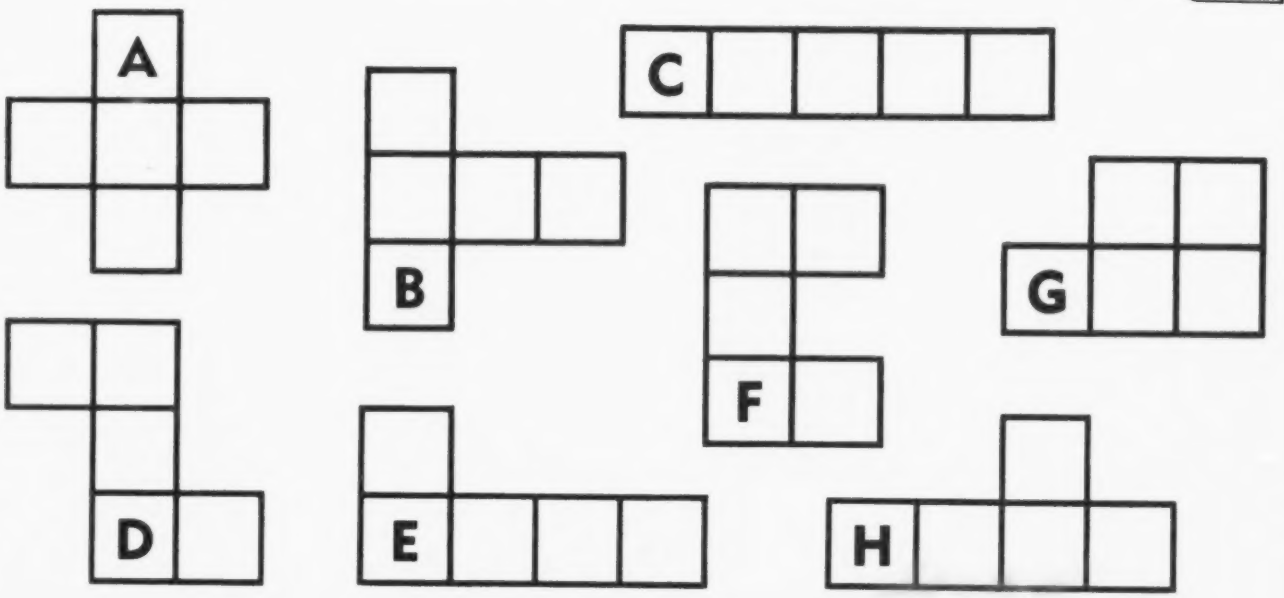
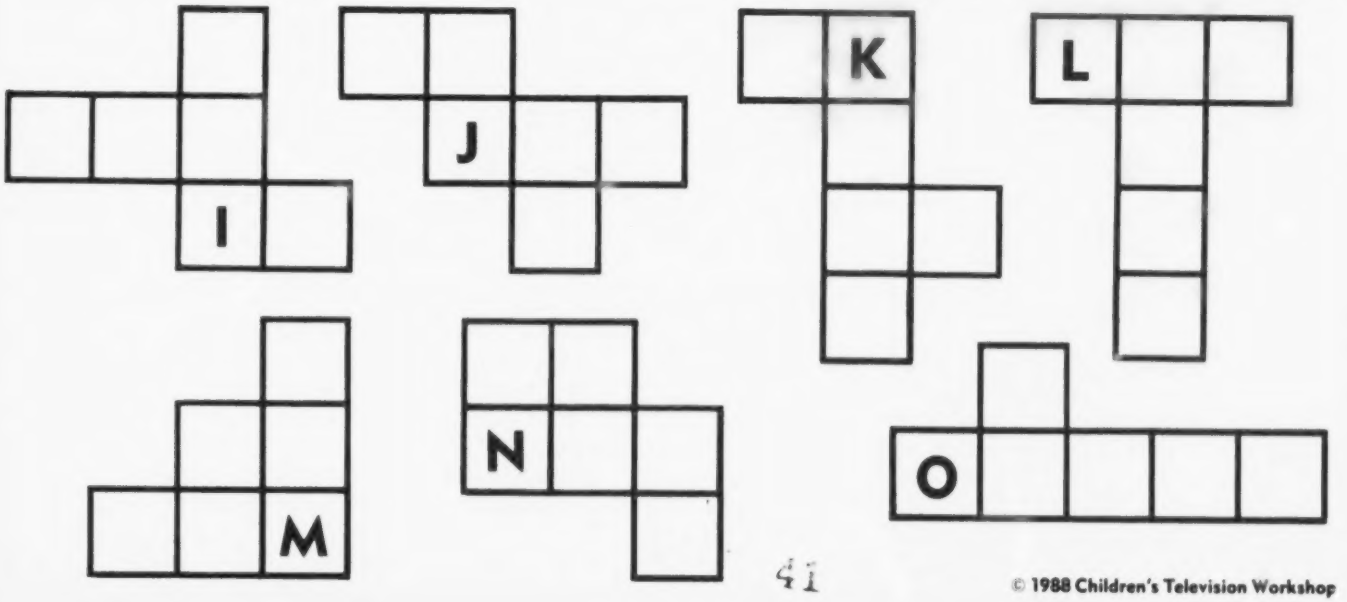
Folding for Answers

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Yes or No	Y														





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THE MYSTERY OF THE

MALTESE PIGEON

Mathnet's assignment—protect the Maltese Pigeon, a crystal statue worth a king's ransom. But the bird disappears. Maureen O'Reilly, the purported owner, is convinced it was stolen by desperate men who'll stop at nothing: Noel Sphinx, Jr., and Jasper Stoutman. Sphinx reveals he's an agent of Malta, sent to regain the bird for his people. Stoutman claims he once had the bird, but it was stolen. Maureen O'Reilly's story becomes shaky when her alibi turns out to be a lie. Kate and George also learn that her business creates ice sculptures. What if the bird at the museum were made of ice and melted away? The phony disappearance tricked Stoutman into showing Maureen where he'd hidden the real bird. She got it—but Mathnet got her.

Book 'Em!

Hope, J.; Reys, B.; and Reys, R. *Mental Math in the Middle Grades.* Palo Alto, CA: Dale Seymour Publications, 1987.

DATA FILE Monday: In estimating the number of museum visitors who'll see the Maltese Pigeon, the Mathnetters assume that fifty people can see the pigeon in five minutes, so twelve times that will be the number of people who'll see the statue in an hour. To calculate, they use the following reasoning: Since $12 \times 5 = 60$, 12×50 must be 600. So 600 people can see the bird every hour. Extend this kind of reasoning in completing multiplication tables like these:

×	6	10	16
9	54		
900			
901			

×	7	100	107
8	56		
80			
82			

DATA FILE Tuesday: George starts calculating the value of the Maltese Pigeon by examining its dimensions. Kate points out that for works of art, that method won't work—the value of the bird isn't based on its volume. When, *if ever*, does something's value depend solely on its volume? For example, how much does salt cost per cubic inch? (Does the brand matter? Is it cheaper when you buy it in large quantities?) What about milk? candy? gold? lumber? pizza? Visit the stores in your neighborhood and see what you can learn.

MATHNET CASEBOOK

HANGING AROUND

Kate and George start off this case figuring out security for the Maltese Pigeon—choosing the best-sized room for displaying the bird, and figuring where guards should stand. This activity lets you work out some museum problems in wall space and security.

DOING THE ACTIVITY

What You Need: Copies of the activity page, pencils.

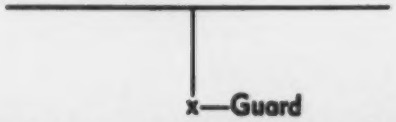
What To Do:

Step 1: Distribute copies of the activity page, HANGING AROUND.

Step 2: Explain that each diagram is the floor plan of a large room in a museum.

Step 3: In Rooms A, B, and C, there are two problems. The first is to find the amount of picture hanging space. Assume that the ceilings are 5 meters high. Since the height is constant, the real question is figuring the length of the walls you'll hang the pictures along. Note that when a wall juts into the main space as in plan A, pictures can be hung on both sides of the wall. Pictures cannot be hung in the door openings.

Step 4: The second problem for Rooms A, B, and C is to place guards so that the entire space is in sight of at least one guard. However, you must use as few guards as possible. Note that a guard placed at the end of a jutting wall can see on both sides of the wall which juts out. All guards are free to look in any direction, but they cannot move from their positions.



Step 5: In Room D, the job is to draw interior walls so that you have at least 1000 square meters of wall space, to be covered by no more than two guards. Encourage your students to find more than one way of doing this. Can they arrange it so that only one guard is needed?

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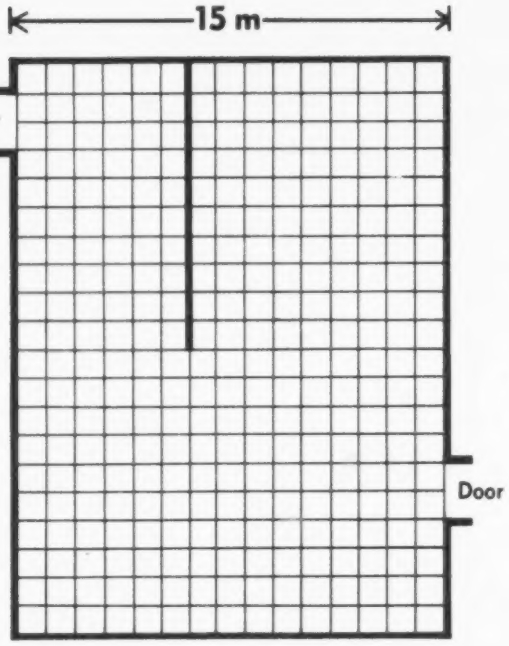
"to cogitate and to solve"

Mathematician

Date

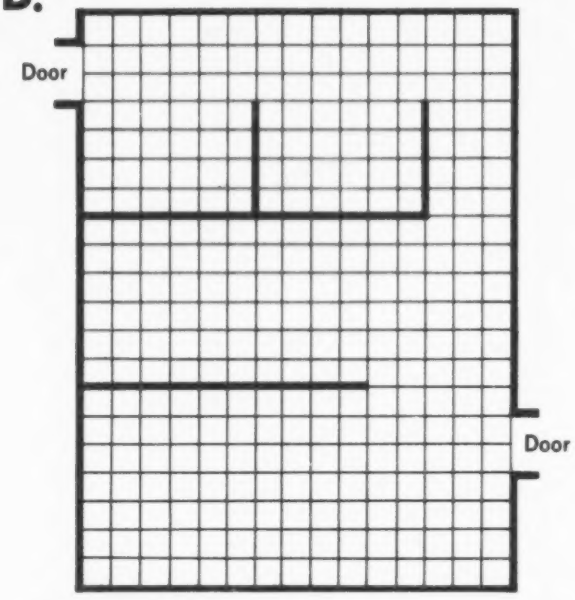
Hanging Around

A.



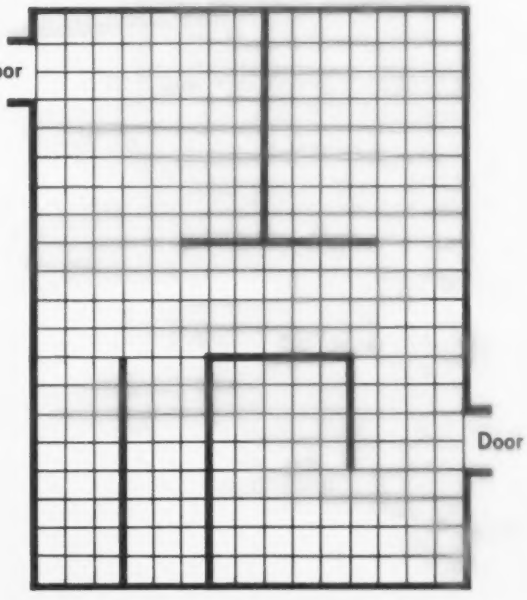
How many square meters of wall space? _____

B.



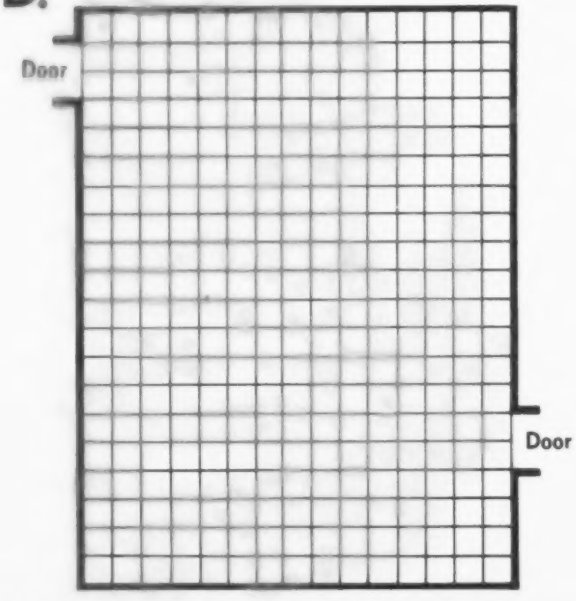
How many square meters of wall space? _____

C.



How many square meters of wall space? _____

D.



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THE PROBLEM OF THE DIRTY MONEY

Mathnet is called in when three trucks disappear, then reappear—without the dirt they were carrying. Working undercover where the thefts occurred, Kate and George learn that all the stolen dirt came from the same spot at an excavation. The Mathnetters also find out why that dirt may be valuable—the land was once owned by Merle Fish, who pulled off the $1,000,000 Finx armored-car heist. Fish died in prison, a recluse who never revealed the loot's hiding place. His one visitor was Norman Mailbag, author of a book on the Finx case. Suspecting that Fish told Mailbag where the money was hidden, the Mathnetters turn their investigation on the writer. Poor Mailbag. He nearly got away clean with a million.

Book 'Em!

Hill, Jane, ed. *Geometry for Grades K-6: Readings from the Arithmetic Teacher.* Reston, Virginia: National Council of Teachers of Mathematics, 1987.

DATA FILE Tuesday: Dirt is being stolen from an excavation site which is divided into 4 quadrants, like this:

A 1, 5, 9	B 2, 6, 10
C 3, 7, 11	D 4, 8, 12

The Mathnetters discover that 12 trucks (numbered 1 through 12) are hauling the dirt away. If there were more trucks, and if the pattern (on the right) were to keep up, could you tell which quadrant truck 13 would haul from? What about truck 15? truck 20? truck 87? truck 2,394? What can you say about the numbers of the trucks in Quadrant D? in Quadrant A? A chart like the one below may help:

Truck	1	2	3	4	5					
Quadrant	A	B	C	D	A					

Follow Up: Suppose the work site were divided into 5 pieces? or 8 pieces?

DATA FILE Friday: George found out that one million dollars (in one-dollar bills) weighs about 2,200 pounds. That made it easy for him to see that in five-dollar bills it would weigh one fifth as much—only 440 pounds. But what if the million dollars were in $10 bills? in $20 bills? in $50 bills? in $100 bills? Using only these denominations, can you make a million dollars weigh 330 pounds? What about 121 pounds? What about 181½ pounds?

MATHNET CASEBOOK

PACKING IT IN

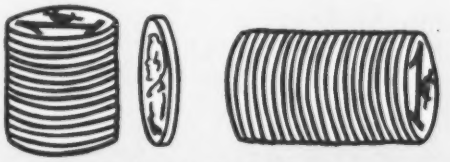
Norman Mailbag nearly escaped to Argentina with a million bucks in his steamer trunk. That must have been some packing job. Sometimes, when you try to fill a space, you'll be surprised at the number of items you can pack away—like the pennies in these problems.

DOING THE ACTIVITY

What You Need: About 20 pennies per student, copies of the activity page, pencils.

What To Do:

Step 1: Distribute pennies and copies of the activity page, PACKING IT IN. Have students place pennies into region A, B, C, etc. Find the maximum number of pennies which will fit in each region. For now, stacking the pennies is not allowed. Students can record their results anywhere within the region.



Step 2: As students finish their work, remove the restriction on stacking. Begin with region A. They can make a stack or a roll which is the height of a penny standing on its edge.

Step 3: Now have students stack and/or roll pennies in regions B, C, and D.

FOLLOW UP

Suppose you hide pennies in something big—a refrigerator, for instance. How many pennies would fit? What about nickels, dimes, quarters? Have everyone make a guess and then do a careful estimation.

MATHNET
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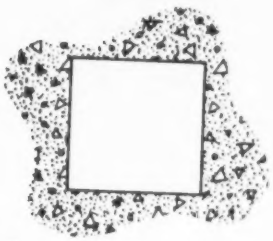
"to cogitate and to solve"

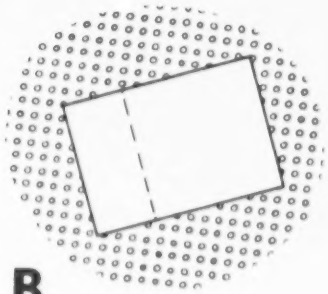
Mathematician

Date

PACKING IT IN



A.



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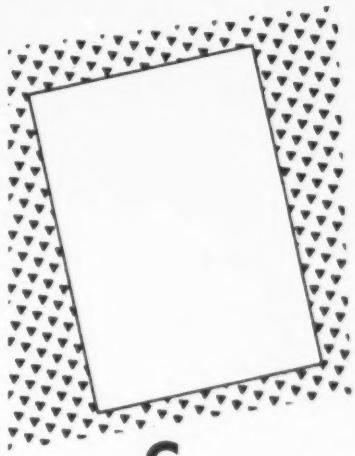
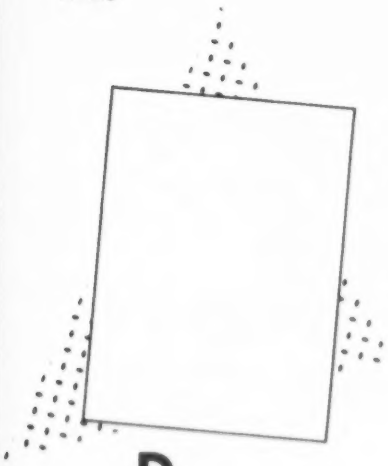


C.



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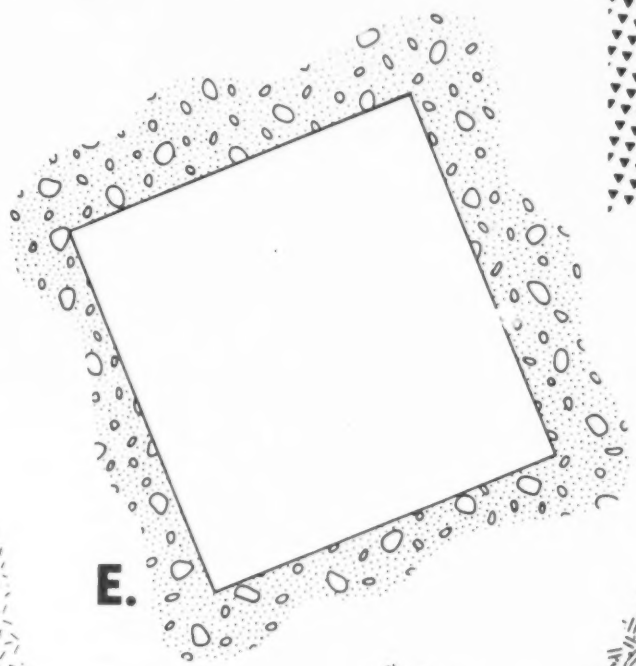
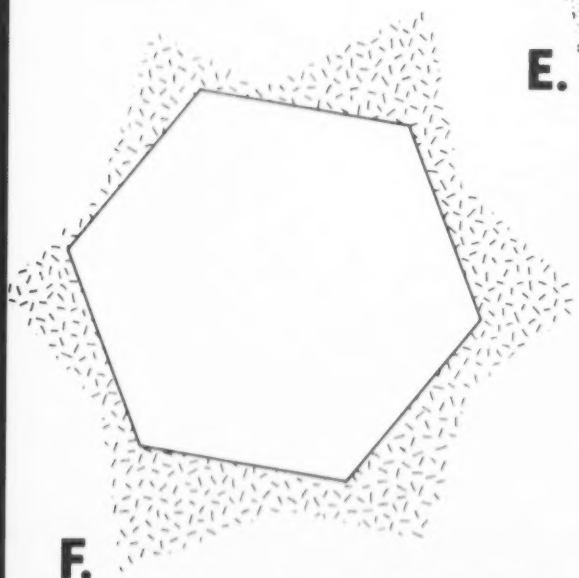
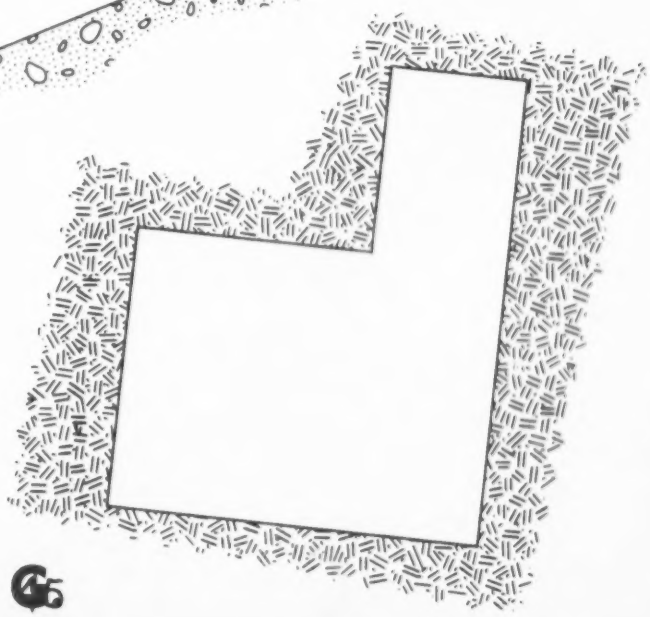


E.



F.



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THE PROBLEM OF THE

MISSING BASEBALL

Mathnet's job seems simple—finding the baseball Nell knocked out of the park. Then they learn it's a rare souvenir belonging to Howie's dad—they've got to find it. Simulating the homer on computer, they deduce that the ball ricocheted off a billboard and into the nearby McGregor house. But before they can search, the whole house disappears. How? It couldn't just fly away. Or could it? A pair of prescription glasses found at the site leads the Mathnetters to Clarence Sampson, a shady character who just rented a house-moving helicopter. The Mathnetters trace the copter's route, find the missing house, and rescue Howie's baseball. They also discover Sampson's motive for house-napping—he wanted to nab a cache of stolen gold hidden inside.

Book 'Em!

Gillespie, N.J. *Mira Math for Elementary School.* Oak Lawn, IL: Creative Publications, 1973.

DATA FILE Wednesday: Computerized data bases are powerful crimestoppers in Mathnet hands. Debbie even finds a data base to match the serial number on an eyeglass frame to 38 people who bought that style. "Data base" usually refers to computerized information, but you encounter lots of non-computer data bases in everyday life—the telephone book, the catalog in the library, even the class list. Discuss with your class what makes up data. Possibilities include names, addresses, phone numbers, serial numbers, Social Security numbers, and batting averages. Have your students keep track of the data bases they use in their personal lives. The class can even construct its own data base, using information about shoe sizes, number of sisters and brothers, favorite colors, brands of toothpaste, and so on.

DATA FILE Thursday: Kate's not only a great detective, she has real computational skill—with lots of shortcuts to use, depending on the particular problem. Today she estimates 330 x 160 by using the fact that 330 is about one-third of 1,000. She reasons that one-third of 160 is about 53, so 330 x 160 is approximately 53,000. How would Kate figure out the following problems? 33 x 15, 51 x 28, 76 x 12. How would you solve them? Explain your reasoning to a friend.

$33 \approx 1/3 \times 100$

MATHNET CASEBOOK

FOLLOW THE BOUNCING BALL

Howie's dad will skin him if Howie can't find that lost baseball. The Mathnetters believe it bounced off a billboard, and that might help them trace its path. Why? Because they know that a ball bounces away from a wall at the same angle that it came toward the wall. There's a fancy way of saying that: The angle of incidence is equal to the angle of reflection. Can you trace the path of a bouncing ball using these angles?

DOING THE ACTIVITY

What You Need: Copies of the activity page, rulers, pencils, a protractor, one wet tennis ball, some paper towels, tape.

What To Do:

Step 1: Use a diagram like the one above to explain the terms "angle of incidence" and "angle of reflection."

Step 2: Tape some paper towels to the floor up against a wall. Roll the wet tennis ball over the towels so it bounces against the wall. Use a protractor to measure the angle of incidence and the angle of reflection. You may want to do this several times, using different angles.

Step 3: Distribute copies of the activity page, FOLLOW THE BOUNCING BALL. Have your students use their pencils and rulers to trace the path of Howie's missing baseball, starting from the dotted line as it enters the various houses. The ball will keep bouncing off walls and obstructions at the same angle as it hit, until it finally exits.

FOLLOW UP

Have your students find alternative paths through the various houses.

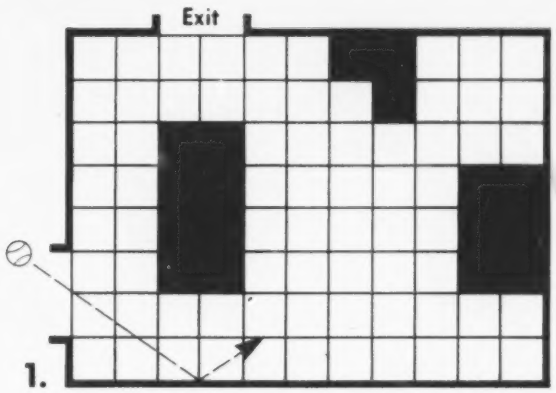
MATHNET
FOUNDED 1985

"to cogitate and to solve"

Mathematician

Date

Follow the Bouncing Ball



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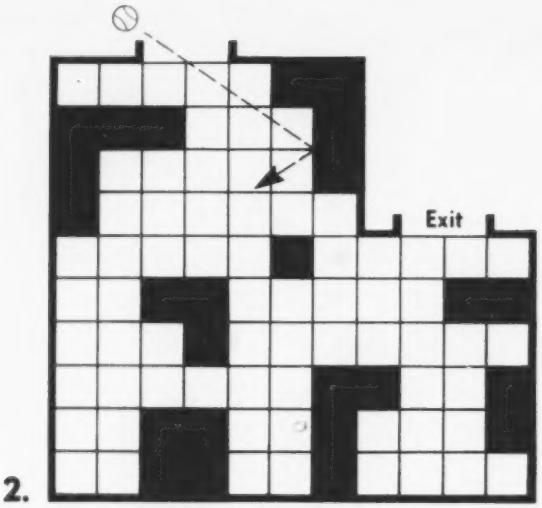

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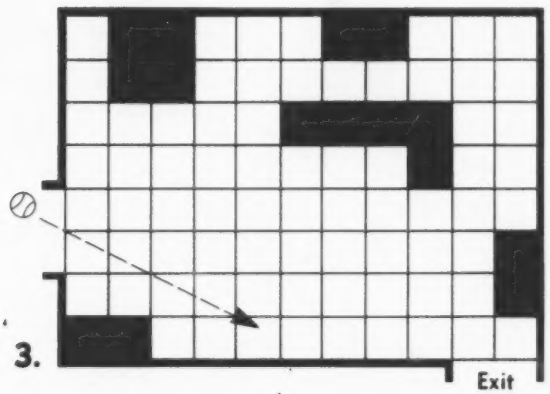

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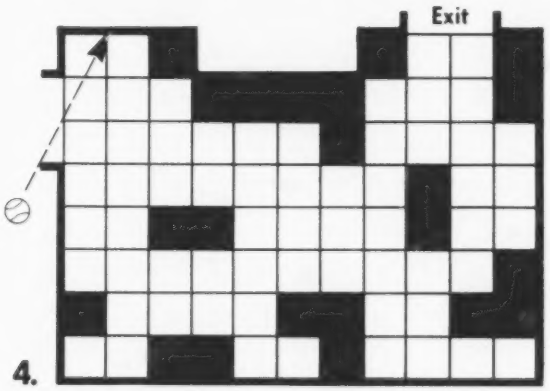

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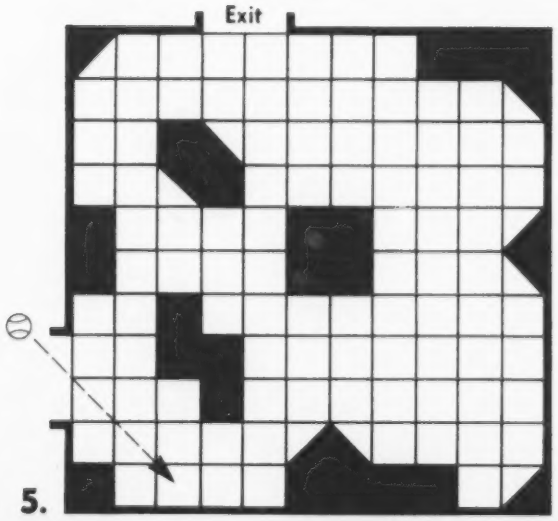

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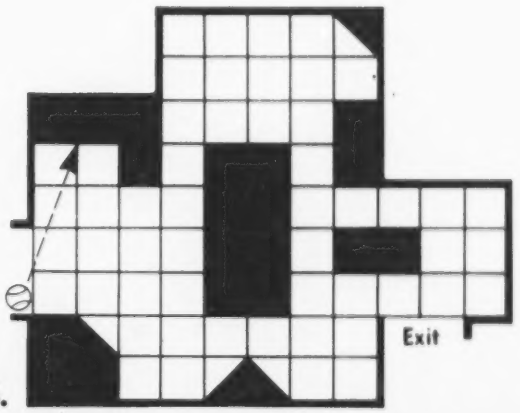

6.

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THE TRIAL OF GEORGE FRANKLY

Kate has to crack an open-and-shut case when George Frankly is arrested for bank robbery. Things look bad—a videotape shows George robbing the bank. No one supports his claim that he was camping on Nomanissan Island—while lots of witnesses identify him as the robber. Even the lone defense witness, a pilot, says he flew George off the island in time to commit the crime. Kate checks weather reports to prove the plane couldn't have taken off when the pilot claims. She makes a great case to get George off the hook when, suddenly, he confesses! All are shocked—until the real George bursts into the courtroom in his underwear. He unmasks his impersonator, and ruins the frame-up constructed by a pair of escaped cons.

Book 'Em!

Labinowicz, Ed. *Learning From Children: New Beginnings for Teaching Numerical Thinking.* Menlo Park, California: Addison-Wesley, 1985.

DATA FILE Wednesday: The robberies committed by the brothers Karamazov follow a pattern. First the brothers deposit a small amount (say, $200). Then they alter the bank's computer records by "adding two zeroes" (making their $200 into $20,000). Next, they withdraw the difference. (In this case, $20,000 – $200 = $19,800). How much would they have to deposit in order to steal $198, or $297, or $9,999? Is there an easy way to solve problems like these?

Amount Deposited	200	100			
Add Two Zeroes	20,000	10,000			
Steal	19,800	9,900	198	297	9,999

Follow Up: Suppose the brothers first deposit $2.95. How would you expect them to alter the records this time? How much would they have to deposit in order to steal $341.55?

DATA FILE Friday: Kate's not only a good mathematician—she's also a good teacher. When defending George, she tells the judge that "visibility was zero...you could see less than 1/16 of a mile... *about the length of a football field.*" Kate knows that the judge will understand an abstract idea more easily if it's expressed in concrete terms. Have the class make a chart for Kate which gives everyday equivalents for common units of measure. Find some things in the classroom which weigh about 1 pound. What do you have which is 1 foot long? How might Kate explain an acre? a gram? a liter?

MATHNET CASEBOOK

NOMANISSAMAP?
The isolated vacation spot Nomanissan Island plays an important part in George's defense—and in the frame-up by the Karamazov brothers. The map on the activity page presents some information—and some questions—about this vacation paradise.

DOING THE ACTIVITY
What you Need: Copies of the activity page, pencils, rulers.
What to Do:
Step 1: Distribute copies of the NOMANISSAMAP? activity page.
Step 2: As a group, locate the various landmarks on the map. Where is George's Camp? Where is Splashdown Airport?
Step 3: Using the scale, have students answer questions like these:
a) How far is it from George's Camp to Sandy Bottoms Beach? from Splashdown Airport to Wutzacookin? How far must you go if you stay on the roads?
b) About how many miles of beaches are there on the island? What's the approximate perimeter of Nomanisson Island?
Step 4: Now try questions like these:
a) How long would it take to go from Ahmagoin to Wutzacookin? (Assume you can walk at 3 mph, jog at 6 mph, and bike at 10 mph.)
b) How long would it take to swim around the island? (Assume you can swim at 2 mph.)
c) How long would it take to tour the whole island on foot, visiting each site at least once?
Step 5: Have the class write their own questions. Be sure to make up some which involve Jesse Motz's boat and Wiley Monger's plane.

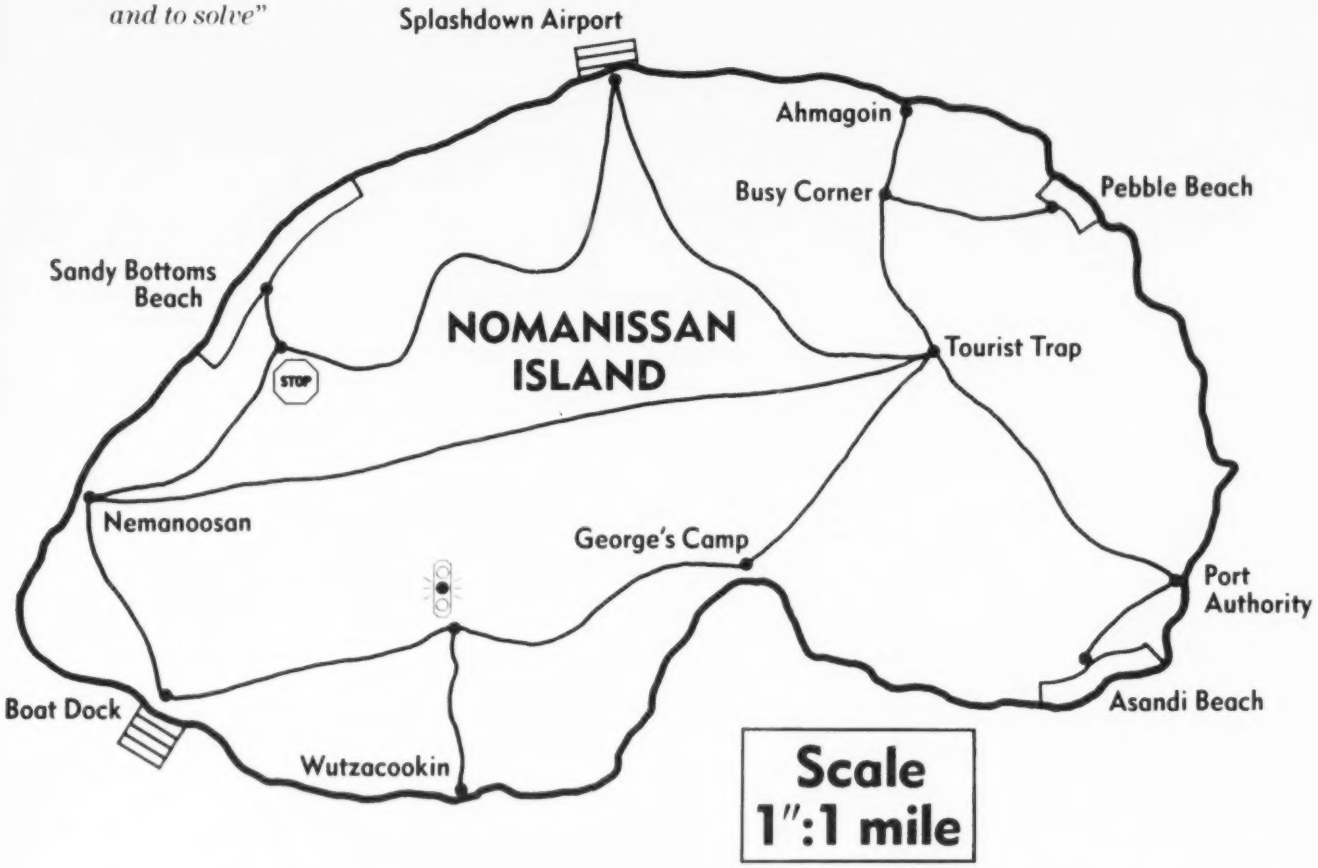
MATHNET
FOUNDED 1985

"to cogitate and to solve"

Mathematician _____

Date _____

NOMANISSAMAP?



Scale 1″:1 mile

Motz's Boat Schedule	
To Boat Dock	
Departs	Arrives
8:00 a.m.	10:00 a.m.
4:00 p.m.	6:00 p.m.
To Mainland	
Departs	Arrives
10:30 a.m.	12:30 p.m.
6:30 p.m.	8:30 p.m.

Fishmonger Airline Schedule	
To Splashdown Airport	
Departs	Arrives
7:00 a.m.	7:30 a.m.
1:00 p.m.	1:30 p.m.
To Mainland	
Departs	Arrives
7:45 a.m.	8:15 a.m.
1:45 p.m.	2:15 p.m.

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CURRICULUM GOALS

SQUARE ONE TV has three goals. For your convenience, GOAL III, which covers mathematical content areas, is written in outline form. Wherever you see a notation like "D3" or "F4" in the Program Guide, the reference is to this outline.

GOAL I: To promote positive attitudes toward, and enthusiasm for, mathematics by showing:

- Mathematics is a powerful and widely applicable tool useful to solve problems, to illustrate concepts, and to increase efficiency.
- Mathematics is beautiful and aesthetically pleasing.
- Mathematics can be understood, used, and even invented by non-specialists.

GOAL II: To encourage the use and application of problem-solving processes by modeling:

Problem Formulation

- Recognize and state a problem.
- Assess the value of solving a problem.
- Assess the possibility of solving a problem.

Problem Treatment

- Recall information.
- Estimate or approximate.
- Measure, gather data, or check resources.
- Calculate or manipulate (mentally or physically).
- Consider probabilities.
- Use trial-and-error or guess-and-check.

Problem-Solving Heuristics

- Represent problem: scale model, drawing, map; picture; diagram, gadget; table, chart, graph; use object, act out.
- Transform problem: reword, clarify; simplify; find subgoals, subproblems, work backwards.
- Look for: patterns; missing information; distinctions in kind of information (pertinent or extraneous).
- Re-approach problem: change point of view, re-evaluate assumptions; generate new hypotheses.

Problem Follow-up

- Discuss reasonableness of results and precision of results.
- Look for alternative solutions.
- Look for alternative ways to solve.
- Look for, or extend to, related problems.

GOAL III: To present sound mathematical content in an interesting, accessible, and meaningful manner by exploring:

A. *Numbers and Counting*

1. Whole numbers.
2. Numeration: role and meaning of digits in whole numbers (place value); Roman numerals; palindromes; other bases.

3. Rational numbers: interpretations of fractions as numbers, ratios, parts of a whole or of a set.
4. Decimal notation: role and meaning of digits in decimal numeration.
5. Percents: uses; link to decimals and fractions.
6. Negative numbers: uses; relation to subtraction.

B. Arithmetic of Rational Numbers

1. Basic operations: addition, subtraction, division, multiplication, exponentiation: when and how to use operations.
2. Structure: primes, factors, and multiples.
3. Number theory: modular arithmetic (including parity); Diophantine equations; Fibonacci sequence; Pascal's triangle.
4. Approximation: rounding; bounds; approximate calculation; interpolation and extrapolation; estimation.
5. Ratios: use of ratios, rates, and proportions; relation to division; golden section.

C. Measurement

1. Units: systems (English, metric, non-standard); importance of standard units.
2. Spatial: length, area, volume, perimeter, and surface area.
3. Approximate nature: exact versus approximate, i.e., counting versus measuring; calculation with approximations; margin of error; propagation of error; estimation.
4. Additivity.

D. Numerical Functions and Relations

1. Relations: order, inequalities, subset relations, additivity, infinite sets.
2. Functions: linear, quadratic, exponential; rules, patterns.
3. Equations: solution techniques (e.g., manipulation, guess-and-test); missing addend and factor; relation to construction of numbers.
4. Formulas: interpretation and evaluation; algebra as generalized arithmetic.

E. Combinatorics and Counting Techniques

1. Multiplication principle and decomposition.
2. Pigeonhole principle.
3. Systematic enumeration of cases.

F. Probability and Statistics

1. Basic quantification: counting; representation by rational numbers.
2. Derived measures: average, median, range.
3. Concepts: independence, correlation; "Law of Averages."
4. Prediction: relation to probability.
5. Data processing: collection and analysis.
6. Data presentation: graphs, charts, tables; construction and interpretation.

G. Geometry

1. Dimensionality: one, two, three, and four dimensions.
2. Rigid transformations: transformations in two and three dimensions; rotations, reflections, and translations; symmetry.
3. Tessellations: covering the plane and bounded regions; kaleidoscopes; role of symmetry; other surfaces.
4. Maps and models in scale; application of ratios.
5. Perspective: rudiments of drawing in perspective; representation of three-dimensional objects in two dimensions.
6. Geometrical objects: recognitions; relations among; constructions; patterns.
7. Topological mappings and properties: invariants.

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MATHNET™

CASEBOOK

Name _____

Mathematician

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